Pain, anxiety and recovery in patients undergoing surgery.

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Pain, Anxiety and Recovery in Patients Undergoing Surgery

by

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ABSTRACT

This study sought to examine the relationships between and factors affecting pain, pain relief, anxiety and recovery in patients undergoing elective abdominal surgery. The complex nature of these variables is reflected by the diverse methods used and conflicting results emerging from research in these areas. Previous work is discussed and used in an attempt to extend understanding of these variables and their relationships.

The consecutive sample comprised 80 patients from three general surgical wards in one London hospital. All data were collected by one researcher using a structured interview schedule. Consenting patients were interviewed preoperatively, then twice a day postoperatively for seven consecutive days. At each interview, patients were asked to rate pain and pain relief on a verbal rating scale, as was the nurse looking after that patient. Recovery was estimated daily using an inventory consisting of 22 indicators of recovery. Patients self ratings of recovery were also recorded. Anxiety was assessed daily using Spielberger's State Trait Anxiety Inventory. At the end of the data collection period, trained nurses on the study wards were asked to complete a questionnaire seeking their opinions about various aspects of postoperative pain relief. Data were analysed using a variety of non-parametric tests.

Analysis revealed, amongst other things, significant positive correlations between postoperative pain and anxiety, and significant negative correlations between postoperative pain and patients' self ratings of recovery. Pain was often poorly controlled after surgery, and nurses' ratings of patients' pain were consistently lower than patients' own ratings, a difference which was significant. Patients' ratings of their pain could not be predicted by their age or diagnosis.

These and other findings are discussed in the light of the research questions and their implications for nursing practice are considered.

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CHAPTER ONE - INTRODUCTION

1.1 Background to the Study

Caring for patients in pain is an important aspect of nursing. The nurse is the health care professional most frequently with the patient, and thus is in an ideal position to assess pain, intervene and evaluate methods of pain control. It is often left to the discretion of the nurse to decide whether and when to give a patient an analgesic, and subsequently to evaluate its effectiveness. Increasingly, therefore, it is becoming recognised that the nurse should have a key role in providing pain relief. For example, McCaffery(1972,1979) has been a pioneer in striving towards recognition of these responsibilities.

The literature indicates that pain is not well controlled in hospital, both in medical patients, Marks & Sachar (1973), and surgical patients, Cohen (1980), Weis, Sriwatanakul, Alloza, Weintraub & Lasagana(1983). A variety of reasons are suggested for this poor relief. These include inadequate knowledge of narcotics and fear of addiction, Cohen(1980), and that nurses tend to control pain expression and pain tolerance rather than pain, Fagerhaugh & Strauss(1977). They describe pain management as being organised around the staff's expectations of how a patient recovers from surgery, rather than the actual course of events. VandenBosch, Getkin & Balaze(1985) state that the treatment of postoperative pain may be organised using guidelines known by the nurse, but often unknown by the patient. McCaffery(1979) argues that nurses are rarely expected to account for the pain relief of each patient in their care. This lack of accountability can lead to pain relief receiving a low priority when patient care is planned and implemented. This is supported by Sofaer(1984) who found only three comments relating to pain in 450 nursing reports of surgical patients. However, nurses' striving towards

professionalism incorporates an increased accountability for actions, including the treatment of pain. Indeed, Meinhart & McCaffery(1983) say,

"..failure to treat pain is inhumane and constitutes professional negligence." p vi

The literature reviewed together with personal nursing experience indicate the need for further research into pain control in hospitalised patients. Although inadequate pain control seem common to both medical and surgical patients, this study planned to focus on postoperative pain. There were several reasons for this decision. Fordyce(1978) points out that acute and chronic pain are very different problems, and that concepts and methods appropriate to one may not be effective with the other: in fact, treatment methods for one may make the other worse. Thus it seems appropriate to study either chronic or acute pain. Whilst improvements are being made in the care of patients with chronic pain, through, for example, pain clinics, Schaefer(1985) and innovations from the hospice movement, Saunders(1979), postoperative pain is a relatively neglected area. Chapman(1985) summed this up by saying,

"...despite the serious nature and high frequency of postoperative pain, it remains poorly understood and minimally researched." p 22

The present author had most clinical experience in surgical settings and had found the management of postoperative pain to be an important issue in practice, as it was not always well controlled, causing much patient suffering. The research questions arose from experiences with these patients in pain. Patients often had pain postoperatively, but most patients seemed to recover eventually regardless of their pain control. Did pain matter - did it influence recovery?

Apart from purely humanitarian grounds, pain may impede recovery, making the patient reluctant to mobilise, take deep breaths and resume the activities of daily living, which in turn increases the risk of stasis

complications, as Dodson(1982) concluded.

Acute pain has also been linked to anxiety. Patients undergoing surgery are likely to be concerned about their operation and experience some acute pain during their hospitalisation. Highlighting this, Sternbach(1968) states, "All that is necessary for maximising pain responses is that anxiety responses also be great." p 25, and Wall(1979) describes acute pain and acute anxiety as, "completely coupled."

Therefore the three variables; pain, anxiety and recovery and their interrelationship seem important factors for patients undergoing surgery. However, previous studies tended to yield rather varied and somewhat conflicting findings.

1.1.1 Pain and Anxiety

Martinez-Urrutia(1975) found increased postoperative pain correlated with increased anxiety state in 59 male patients. Jacox & Stewart(1973) also demonstrated that neuroticism was positively related to pain intensity in 31 surgical patients. These results were not confirmed by Bruegel(1971) who studied 85 surgical patients and found no relationship between anxiety and pain, or by Taenzer, Melzack & Jeans(1986). They investigated 40 patients who had a cholecystectomy, and found no relationship between preoperative anxiety and postoperative pain.

1.1.2 Pain and Recovery

There has been very little research into the relationship between pain and recovery. Wolfer & Davis(1970) found a negative correlation these two variables after surgery.

1.1.3 Anxiety and Recovery

Increased preoperative fear was found to correlate with poor recovery in a study of 57 female patients having abdominal surgery by Sime(1976).

She found a linear relationship between preoperative fear and recovery, with the least favourable recovery being associated with higher preoperative fear. Mathews & Ridgeway's(1981) review showed that high anxiety trait correlated with poorer physical recovery. However, other work has not supported these findings. For example, Johnston & Carpenter(1980) found no relationship between preoperative anxiety and postoperative recovery when they studied 73 patients undergoing elective major gynaecological surgery. Also, Johnson, Leventhal & Dabbs(1971) concluded preoperative fear was unrelated to recovery in 80 female surgical patients. Similarly, Wolfer & Davis(1970) found no relationship between anxiety trait and postoperative recovery. Cortisol and noradrenaline excretion in the urine, a recovery inventory and anxiety state were assessed in 17 patients having middle ear operations by Salmon, Evans & Humphrey(1986). They found no correlation between state anxiety and endocrine measures and concluded that anxiety was not related to the processes mediating physical recovery.

The reasons for these seemingly contradictory results are partly methodological. Pain, anxiety and recovery are each complex phenomena, difficult to define, or, in some studies, not defined at all. Accordingly, there are many different ways of assessing each variable, depending at best on the investigator's definition of the variable. The timing of assessment of each variable can also be diverse, all of which could contribute to these mixed results.

The present study seeks to build on earlier work examining these three seemingly important variables. The individual patterns of these variables would be charted over the immediate postoperative period, and any interaction between them studied. These interactions will be reviewed within the conceptual framework of the Gate Theory, Melzack & Wall(1965), revised by Wall(1978). Additional research questions raised by this study are: 1) Do nurses know when patients are in pain? and 2) What action do nurses and patients take, if any, to alleviate this pain?

1.2 Statement of Purpose

This study aims to explore patterns of pain, pain relief, anxiety and recovery in patients undergoing surgery, and to assess some of the relationships between these variables, and factors affecting them. It also aims to assess the nurses' and patients' ratings of the patients' pain and pain relief and to examine methods of providing pain relief used by the patient and the nurse.

It aims to provide information about pain and its relief, and their effects on anxiety and recovery throughout the postoperative period. This extension of knowledge about postoperative pain, anxiety and recovery will facilitate increased accountability for nurses actions and ultimately, it is hoped, enhance professionalism.

1.3 Aims Of The Study

These were to:

1) Assess whether pain and/or pain relief affect recovery.
2) Determine whether anxiety affects pain, pain relief and/or recovery.
3) Ascertain any differences between nurses' and patients' ratings of patients' postoperative pain and pain relief.
4) Identify pain relieving strategies used by nurses or patients.

1.4 Definitions

1.4.1 Assessment of Pain

Patients pain will be assessed by patients and nurses, using a verbal rating scale. This will comprise a 100 millimetre(mm) horizontal line with the words 'No Pain At All, A Slight Pain, Quite A lot of Pain, Very Bad Pain and Agonising Pain'. Each of these descriptions will be centred under 0, 25, 50, 75 and 100mm points respectively along this line, from the left to right, see Appendix B.3. This scale will be given to patients preoperatively, then to nurses and patients twice a day postoperatively for seven consecutive days. Patients will be asked to put a cross on the line wherever is 'most like their pain now'. The distance to this cross will then be measured in millimetres from the left hand side of the scale, and represents their pain score.

1.4.2 Assessment of Pain Relief

Pain relief will be assessed by patients and nurses using a verbal rating scale. This will comprise a 100mm horizontal line with the words 'Pain No Better, Pain Slightly Better, Pain Quite A lot Better, Pain Very Much Better and Pain Completely Better'. Each of these descriptions will be centred under 0, 25, 50, 75 and 100mm points respectively along this line, from left to right, see Appendix B.4. This scale will be given to patients preoperatively, then to nurses and patients twice a day postoperatively for seven consecutive days. Patients will be asked to put a cross on the line wherever is 'most like their pain relief now'. The distance to this cross will then be measured in millimetres from the left hand side of the scale, and represents their pain relief score.

1.4.3 Assessment of Recovery

A recovery inventory comprising the presence (score=1) or the absence

(score=0) of 22 indicators of recovery, will be completed from questions answered by patients and from documentary records, see Appendix B.1, page 429. This inventory will be completed preoperatively, then once a day postoperatively for seven consecutive days. A total score per day will be computed by adding these scores and converting them to a percentage. This percentage will be compared to patients own ratings of recovery, which will be assessed preoperatively then once a day postoperatively for seven consecutive days. Patients will be asked 'If 100% is the fittest you've felt recently, how fit do you feel now?' The percentage score given will represent the recovery self rating score.

1.4.4 Assessment of Anxiety

Anxiety will be assessed using anxiety scores derived from the State-Trait Anxiety Inventory, forms Y, devised by Spielberger, Gorsuch, Lushene, Vagg & Jacobs(1983). This consists of 20 questions on 'how you generally feel', to assess anxiety trait, and 20 questions on 'how you feel now', to assess anxiety state, see Appendix B.6.2. Anxiety trait and state will be assessed once preoperatively. Anxiety state only will be assessed once a day postoperatively for seven consecutive days. Patients will be able to see the questions and response categories, which will be read aloud by the researcher, who will also record the patient's verbal response to each question. Each question has four response categories, scoring 1-4 for each item. Scores on both the trait and state scales thus range from 20 (low anxiety) to 80 (high anxiety).

1.4.5 Postoperative Period

This is the period of time which begins with the patient's arrival back on the ward after surgery, day 0, until discharge or midnight on the seventh postoperative day, whichever is the earlier.

1.4.6 Pain Relieving Strategies

Any physical or psychological method used by the patient or the nurse to relieve postoperative pain, as assessed via interview or questionnaire.

1.4.7 Patient

Any surgical patient on the chosen wards fulfilling criteria for inclusion in the study.

1.4.8 Nurse

The learner (any student or pupil nurse) or trained nurse (enrolled or registered nurse, including the ward sister) providing 'total patient care' for the patient for that shift.

CHAPTER TWO - LITERATURE REVIEW

2.1 Pain

2.1.1 Introduction

Pain is a multidimensional, subjective experience, which is influenced by a complex interplay of physiological, psychological, social and cultural factors. Melzack & Wall(1982) describe pain as a category of complex experiences, not a single sensation produced by a specific stimulus. Thus there is not a linear relationship between stimulus and pain intensity, but rather any or all of a number of factors that can interact in this relationship, changing the nature or intensity of the pain experience.

Pain has been described by Melzack(1984) as, an "...endless variety of qualities that are categorised under a single linguistic label..." p332. Melzack & Casey(1968) divide the experience of pain into three main areas, 1) sensory-discriminative, 2) motivational-affective and 3) cognitive-evaluative. The sensory-discriminative aspects describe the experience in terms of temporal, spatial, pressure, thermal and other properties. The motivational-affective dimension includes qualities such as aversive drives like tension and fear. The cognitive-evaluative component includes evaluation of the overall situation. They describe the last two components as providing an, "almost forgotten contribution to pain." p435.

Therefore pain can be viewed as a complex experience, influenced by many variables. Pain always occurs against a background of experience, or in the context of other experiences, Chapman(1978), and thus the response of each individual will be subjective and unique. If pain is so complex and affected by so many variables, can it be defined?

2.1.2 Definition of Pain

Beecher(1957) argues "Pain is, it must be admitted, uncommonly difficult to define." p61. The attempt to define pain, according to Lewis(1942), "could serve no useful purpose." pV. These statements may lead one to question the wisdom of any attempt to define pain. However, if pain is to be assessed, some concept of what is being assessed is necessary. Melzack & Casey(1968) suggest that pain must be defined in terms of its sensory, motivational and central control determinants. These different facets of the pain experience are incorporated in Sternbach's(1968) definition of pain as, "1) A personal, private sensation of hurt; 2) A harmful stimulus which signals current or impending tissue damage; 3) A pattern of responses which operate to protect the organism from harm." p12. The International Association for the Study of Pain Subcommittee on Taxonomy(1978) define pain as being,

> "An unpleasant sensory and emotional experience
> associated with actual or potential tissue damage,
> or described in terms of such damage." p250.

They add the note, "Pain is always subjective."

Pain can be interpreted and expressed in many different ways. McCaffery(1972) emphasised that the patient was the only real authority about their pain in her definition, "Pain is whatever the experiencing person says it is and exists whenever he says it does." p8. This same approach to defining pain was expressed by Bishop(1956), when in a personal communication to Beecher, (which Beecher(1957) published, p62), he described pain as, "...what the subject says hurts." It could be argued that McCaffery's definition side steps the complexity of pain, conversely, it can also be seen as embracing the complexity of pain without attempting to further dissect it.

Do any of these definitions adequately define this seemingly elusive concept of pain? Chapman(1976) argues that the validity of any operational definition can be judged on the basis of the theoretical assumptions adopted

by the investigator. Thus it appears to be the responsibility of the individual investigator to select the definition which is most appropriate to the theoretical basis of their study. McCaffery's definition contains the theoretical assumption that the patient is the only authority about their pain, and it was from this assumption that the present study was developed.

As this research aims to investigate pain after surgery, the literature was reviewed to establish whether patients experience pain after surgery, the likely causes of any such pain and some of the other issues this pain and its relief raise.

2.1.3 Is Pain Experienced Postoperatively?

Loan & Dundee(1967) studied 1,220 patients postoperatively who needed analgesics in the recovery room. Patients were classified by operation. They found 74.6% of patients having thoracic surgery, 72.8% having cardiac surgery, 63.2% having upper abdominal and 51.3% having lower abdominal surgery needed analgesics postoperatively. They assessed the "incidence of need for postoperative analgesics as observed in 1,220 consecutive patients." p760. However, it is uncertain how the authors assessed the need for analgesic drugs. It is not clear if patients were specifically asked whether they wanted a painkiller. Parkhouse, Lambrechts & Simpson(1961) investigated narcotic analgesics given over the first forty-eight hours after surgery. They found 93% of patients who had gastric surgery and 91% who had gallbladder surgery received analgesics postoperatively. Only 7.9% of 453 patients with abdominal operations had no analgesic drugs postoperatively. In a more recent study, McQuay, Moore, Lloyd, Bullingham & Evans(1982) investigated 410 patients after minor orthopaedic limb surgery. They found 64.15% had requested analgesics within two hours of the operation, and only 5.6% had no analgesics at all whilst in hospital.

Therefore it appears that patients do experience pain of varying extent after surgery, as assessed by administration of analgesics. It may not,

however, be helpful to classify patients according to operation. Copp(1974) found 20% of patients complained of a "blinding, desperate pain" after operations ranging from open heart surgery to adult tonsillectomies and impacted wisdom teeth.

2.1.4 Causes of Postoperative Pain

Painful stimuli may occur in any damaged tissue. After surgery causes of pain are likely to be cutaneous, deep somatic and visceral, Johnson(1977). Cutaneous pain, involving skin and superficial tissues, may arise from the surgical incision, and from the site of any tubing, such as drainage tubes. After surgery this pain can be aggrevated by, for example, coughing and moving. Deep somatic pain, involving muscles, tendons and ligaments, may arise from muscle stretching during surgery, and muscle spasms after surgery. Visceral pain can occur after organ handling and displacement, and after the stretching and tearing of internal tissues during surgery. After surgery, the viscera can be distorted and stretched by, for example, the build up of gas, causing pain. It is likely that pain arising from different tissues may be of different intensity and unpleasantness, and may even respond differently to analgesic drugs, Dodson(1985). Patients may thus have different types of pain at different times after surgery.

Other authors have identified specific causes of postoperative pain. Coughing, turning and ambulating were most painful for the 31 surgical patients studied by Jacox & Stewart(1973). The site and extent of the operation, and major discomforts such as flatulence or bladder distension were described by Knight & Mehta(1978) as influencing pain. Sweeney(1977) identified intravenous infusions, urinary catheters, drainage tubes, nasogastric tubes, bulky dressings, nausea, backache and fatigue all as discomforts that can become part of the overall response to pain. Thus many variables can interact postoperatively to cause pain, not only arising from the operation, but also subsequently, during the postoperative period.

2.1.5 Why Relieve Postoperative Pain?

Apart from the purely humanitarian aspects of pain and suffering, postoperative pain is undesirable. It can retard recovery by causing nausea (thus reducing fluid intake), making the patient reluctant to ambulate, increasing the risk of stasis complications such as deep vein thrombosis, urinary tract infection, and increasing flatulence. Deep breathing and coughing are also avoided, increasing the risk of respiratory infection, Dodson(1982). The patient can become fatigued and demoralised, too tired to engage in activities that may enhance recovery and prevent complications. A longitudinal study of 14 men undergoing elective herniorraphy was conducted by Fordham(1982). Standard tests of physical fitness were used, including lung function and exercise tests. These were carried out at the first outpatient visit, on admission, the day before discharge and at the outpatient follow-up one month after surgery. Although pain was not specifically assessed, Fordham concluded from the behaviour of these patients that pain and fear of pain were major deterrents to deep breathing and exercise. She linked this to recovery, arguing exercise itself may relieve or avoid muscle and joint aches, and that this activity could give a sense of progression towards recovery, which may also reduce anxiety and tension.

The expectation of unrelieved pain can be stressful for the patient, as Volicier & Bohannon(1975) discovered. They asked 261 short term medical and surgical patients to rank 49 items from the least to the most stressful. Not getting relief from pain medication was ranked 40th and not getting pain medication when it was needed was ranked 42nd out of the 49 items. Both items were thus ranked as highly stressful events in hospital. The importance attached to pain and its relief by patients was emphasised by McConnell(1983) who described pain as one of the most serious postoperative complications from the patients point of view. This becomes more serious if pain then disrupts thought processes, causing a reduction in learning, as Sternbach(1968)

maintains. This has implications for patient understanding of postoperative teaching or any other information they are given. Melzack & Wall(1982) argue that as pain increases in strength and duration, behaviour is increasingly dominated by the pain. Plato, in a 1929 translation of Timaeus, writes that when a man is in excessive pain, "...he is unable either to see or here anything correctly, and he is at such time distraught and wholly incapable of exercising reason." p223/225. Milton(1667) in Paradise Lost writes,

"...But pain is perfet miserie, the worst
of evils, and excessive, overturnes
All patience..." Book VI Lines 462-464.

Pain may impede recovery, be stressful for the patient, and disrupt thought and behaviour. Adequate control of pain enabling the patient to work towards the goal of recovery without the largely unnecessary and unpleasant obstacle of pain would seem desirable.

2.1.6 What is the Aim of Pain Relief?

There are differing professional and patient opinions on the aims of pain relief and what constitutes a realistic level of relief.

Weis et al(1983) state, "In theory the goal of treatment should be complete relief." p72. However their study demonstrated variable committment to this goal. They sent a questionnaire to 142 nurses working on surgical wards, 70 of which were returned, a 49% response rate. This fairly low response rate may illustrate the lack of importance attributed to pain relief by these nurses. Of those nurses who replied, 22% aimed for complete relief of pain, 54% for enough relief so the patient noticed the pain but was not distressed, 11% for moderate relief with small distress and 9% for relief at peak periods of pain only. The question was unanswered by 4% of nurses. Similarly, Cohen(1980) found diverse goals for pain relief. She asked 121 nurses their overall aim of administering analgesics on the first two postoperative days: 3.3% said they aimed to completely relieve pain, 57.5% to

relieve pain as much as possible, 38.3% to relieve pain just enough for the patient to function and 0.8% to relieve pain so the patient could just tolerate it. This spread of responses was less in evidence when Sofaer(1984) used the same categories with 64 nurses. She found a distribution between the categories of 9%, 79%, 9% and 3% respectively. Thus nurses goals in her sample were more heavily weighted towards relieving pain 'as much as possible'. When 98 of the 109 patients in Cohen's sample considered the same goals, 29% hoped for complete relief, 47% for as much as possible, 18% for just enough to function and 6% so they could just tolerate the pain. Sofaer's 87 patients considered the same categories and their distribution between categories was 28%, 38%, 26% and 8% respectively.

That some nurses and patients in both studies aimed 'To relieve pain so the patient can just tolerate it' indicated a degree of endurance was expected and accepted by a small proportion of nurses and patients. However, Storlie(1978) describes the aim of relief as not, "how much can the patient endure", but to relieve pain, "totally, if possible, and if not, then to lessen the patient's intensity of discomfort." p39. Pain relief is approached from a different perspective by Hanks(1983) who divides pain relief not into effectiveness levels, but time/activity periods. He aims that cancer patients will be pain free at night, then pain free at rest and finally pain free on movement. He feels the first two aims are almost always possible. This approach could provide a slightly different way of looking at postoperative pain.

There may be a variety of expectations when giving or taking painkillers, but do patients always take a painkiller because they are in pain? Keats(1956) points out that it is not only pain that will make a patient ask for a painkiller, other discomforts will influence this. Chapman(1985) suggests complaints of pain may be the only way a patient can express a complex constellation of negative feelings and fears. These distinctions may not be helpful as other discomforts and feelings can form

part of the overall pain experience. However, in relation to the aim of pain relief, if Bullingham's (1984) description of "maximum comfort" as a realistic goal in pain relief is used, this takes into account the multifactorial nature of the experience of pain, including discomforts and negative feelings.

It seems from the literature reviewed, the aim of pain relief amongst nurses tends to be for as much relief as possible, and the aim amongst patients for as much as possible or complete relief. Are these aims actually put into practice?

2.1.7 Is Pain Adequately Controlled Postoperatively?

Johnston(1976) in a study of 43 postoperative patients and 19 nurses, found nurses and patients did not communicate on, amongst other things, pain efficiently. She asked patients to complete a form to show how they felt at that moment. "As near simultaneously as possible" p33, a nurse completed a similar form describing how the patient felt. The patients, all on gynaecological wards, were interviewed on average four days after surgery. The questions on pain were incorporated into a recovery inventory and covered duration of pain, rated on a six point scale from 'none' to 'very much', and pain intensity, also rated on a six point scale from 'very mild' to 'extremely intense'. Nurses had significantly lower scores than patients for both pain duration and intensity. Eleven nurse ratings overestimated and twenty-four underestimated pain duration, whilst seven overestimated and twenty-seven underestimated pain intensity. The nurses clearly underestimated the problem as perceived by the patient. Indeed the nurse had fewer correct answers than would be expected by chance when assessing pain intensity. Johnston thus concluded,

"...the data would suggest that nurses do so badly on the assessment of pain that analgesics might more reliably be given to the patients in greatest pain by distributing them randomly, nurses performing worse than chance." p41.

Is this substantiated by other research? Smith & Utting(1976) in a study of postoperative patients who had upper abdominal surgery found over half the pain recorded on the first postoperative day was in the most severe category available, 'very unpleasant indeed; I would be very unhappy if I had to go through all this again.' No patient received all doses of analgesics available and usually fell far short. The time at which analgesics were administered was found to depend on nursing routine, patients seldom asked for painkillers. A similar rating of pain was used by Drew, Moriarty & Shapiro(1968) who found 42% of 250 patients described their pain as 'very unpleasant indeed' despite use of conventional analgesics. This figure increased to 57% in patients having upper abdominal surgery. Further support for poor control of postoperative pain was provided by Sriwatanakul, Weis, Alloza, Kelvie, Weintraub & Lasagna(1983b) who interviewed 81 postoperative patients 72 hours after surgery. These patients had undergone major abdominal, orthopaedic, urologic or gynaecological surgery. There were 91% of patients who reported having had pain of sufficient intensity to disturb their sleeping, eating, concentrating, talking and moving around. Cohen(1980) in a study of 109 post-abdominal surgery patients found 75% had moderate or marked pain distress. Although Cohen acknowledged pain was subjective, patients were not asked to rate their pain. The 'pain distress' score was a composite score derived from responses to the following questions, a) If they had any difficulty sleeping or b) concentrating; c) if pain relief was adequate, and if pain caused them to d) cry out; e) feel anxious or nervous; f) feel depressed; g) feel irritable; or h) be angry. These were Yes/No questions, scoring 0 for no pain/distress and +2 for the presence of pain and distress. There were four additional questions relating to the degree of distress for sleep, concentration, depression and adequacy of relief, scoring 0,1,2 and 3 for none, slight, moderate and marked respectively. Thus a total pain distress score could range from 0 to 28. Total scores of 0-9 were designated as slight pain distress, 10-19 as moderate

and 20-28 as marked pain distress.

It could be argued that patients may have had difficulty in retrospectively differentiating between pain as a cause of disturbed sleep or concentration and the influence of other disturbances, such as noise, on these variables. The scale also involved summating dichotomous (score 0 and 2) and ordinal (score 0,1,2 and 3) data in one scale. This implies that for the dichotomous scores, if pain did affect the variable under question (score 2) it was to a 'moderate' (score 2) degree. The use of sleeping, concentrating, depression and inadequate relief twice in the total score may have elevated scores for patients with pain affecting these areas, and reduced them for patients whose pain affected other areas. Patients were interviewed early on the third postoperative day, and it appears they were asked the specific questions previously described, as applied to the period since their surgery. The possibility of memory distortions over this time introducing a bias to the results cannot be ignored.

The way in which pain is assessed in these studies thus varies. Pain was described as 'clinically significant' as regards duration, severity and unexpectedness for 20% of 106 postoperative patients studied by Keeri-Szanto & Heaman(1972), although the meaning of this phrase was not further elaborated. Weis et al(1983) who studied 66 postoperative patients, found 41% of patients were judged by the authors to be in moderate or severe pain at the peak of analgesia. However, the criteria they used to make this judgement are not reported and the patients were not asked about their pain, so these results should be interpreted cautiously. The figures in this study are somewhat different from those of Cohen(1980), but whereas Cohen studied the first three postoperative days, Weis et al only looked at the first four hours after patients had received a parenteral narcotic analgesic, (these observations being made within 48 hours after surgery). A figure of 23.2% of patients in severe postoperative pain was reported by Nayman(1979), however this figure was derived from a "personal retrospective view" and it is not clear what was

assessed or over how long. Yet another approach was used by Kimberely, Corall & Baum(1982) when they assessed the adequacy of pain relief as the percentage of analgesics given of the anticipated necessary dose. Analgesia was graded as satisfactory of 67-100% of the dose was given, as fair if 34-66% and inadequate if less than 33% was given. In the first 24 hours, 40.4% of 89 'major' operations and 85% of 80 'intermediate' operations were classified as obtaining inadequate analgesia by this definition. However, no attempt was made to verify these classifications with the patient.

Despite the different methods used to assess postoperative pain, which may partly explain the varying percentages of patients in moderate or severe pain, the review of the literature indicates that pain remains a complaint of many postoperative patients and is a problem not yet resolved by the nursing staff.

2.1.8 Why Is Pain Relief Inadequate?

a) Low Patient Expectations

Studies already reviewed showed some patients did not always expect substantial pain relief. This is supported by studies which compare patients pain scores with their assessment of the adequacy of pain relief. Although 75.2% of patients in Cohen's(1980) study were in moderate or marked pain distress, 79.8% felt analgesia was adequate. In addition, 82% of nurses in Cohen's sample felt analgesics met the patients needs. This seems to indicate that these patients were very closely meeting the nurses expectations of the number of painkillers they 'should' have, whether or not this quantity resulted in pain relief. These findings are supported by Weis et al(1983) with 75% of their sample who said relief was adequate, despite 41% being in moderate or or severe pain at the peak of analgesia. Similarly, Donovan(1983) studied 200 postoperative patients and found that whilst 86%

said pain relief was adequate, more than a quarter had moderate, severe or unbearable, unalleviated pain, as assessed on a verbal rating scale.

b) Breakdown in Communicaton

Patients may be unwilling, or feel unable to communicate their pain to the nursing staff. Jacox & Stewart(1973) investigated 31 patients who had a herniorraphy or cholecystectomy. They found 42% would remain outwardly calm when in pain, although it may be that these patients were fulfilling the nurses expectations in controlling their expressions of pain. However, if the nurse, for whatever reason is unaware of the patients pain and assumes the patient will ask for a painkiller if needed, whilst the patient is waiting for the nurse to administer a painkiller, problems are likely to occur.

Not only do patients tend not to complain about pain relief, but there seems to be some confusion over who should provide this relief. Pilot study work with 40 surgical patients by Hayward(1975) found nearly 60% were unsure when and to whom a request for painkillers should be made. He also found patients often assumed the doctor or nurse would automatically know when medication was needed and provide it. This finding was confirmed by Smith & Utting(1976) who concluded patients thought the nurse would give them a painkiller if they should have one. However, Cohen(1980) found 32% of nurses would wait for a patient to request medication, indicating a possible lack of communication between patient and nurse over where the responsibility lies in initiating a request for painkillers.

c) Clinical Setting

Even if the nurses know the patient is in pain, they may not administer painkillers. Fagerhaugh & Strauss(1977) observed and interviewed patients in several different wards, including one caring for patients having 'routine surgery'. They suggested the discrepancy between actual and possible pain relief was due to: 1) the work demands of the clinical setting, including

competing tasks and time and staff shortages, 2) the institutional accountability surrounding pain management, or lack of it, and 3) the complexity of patient-staff and staff-staff relationships, including the need of the patient to know when and how to request pain relief and the amount of pain they are expected to endure, together with each nurse and patient having their own, possibly conflicting, philosophy about pain and its relief. They went on to say, "what may be routine and non-problematic for the staff because the patient does not complain may be very problematic for the patient." p66. The treatment of pain may thus partly depend on how demanding the patients is, and on the attitude of the staff, as Knight & Mehta(1978) suggest, and on the organisational setting in which pain is managed, Fagerhagh & Strauss(1977).

d) Attitudes to Pain and its Relief

McCaffery(1979) suggests there is a fear of pain, rather like the fear of and treatment of dying patients. Both areas are surrounded by a certain lack of accountability, and avoidance buffers one's own vunerability. This concept of avoiding the issue is highlighted by McQuay et al(1982) who argue that as the patient and the pain eventually go away, and because poor pain relief is often forgotten once the pain has gone, at least by the prescriber, this mitigates against an improvement in pain relief.

A study by Baer, Davitz & Lieb(1970) in which social workers, nurses and doctors were asked about pain and distress found that social workers inferred the most pain, followed by nurses and then doctors. In a similar study, Lenburg, Glass & Davitz(1970) found nuns, then teachers and last nurses and doctors inferred most pain and distress. This may be because doctors and nurses see this pain and distress routinely and regard it as 'normal', or because they are protecting themselves from pain and suffering by distancing themselves. They may do this by being 'busy': Ley(1976) found patients felt it was difficult to interrupt a busy nurse.

Pain and suffering are inferred rather than directly observed, thus as Davitz & Davitz(1981) point out, the need to observe, interpret, judge and act represent variables, anyone of which can be affected in a variety of ways. The doctor has to prescribe the drug, and the nurse has to administer it, but another variable is the patient's acceptance of the drug. Hayward(1975) stated 'many' patients felt it was better to do without painkillers as they feared addiction, although no figures were given. The nurse may reinforce rather than dispel this fear, encouraging patient to do without and to keep expressions of pain under control. Strauss, Fagerhaugh & Glaser(1974) argue that if an unexpected pain trajectory appears, the ward may not be organised nor the staff psychologically set to handle it; the patient is labelled 'uncooperative' or 'difficult' and staff/patient relationships deteriorate.

e) Inadequate Knowledge

Inadequate treatment could, of course, be influenced by inadequate knowledge of narcotic analgesics. Sriwatanakul et al(1983b) concluded the optimum doses and duration of action of morphine and meperidine (Pethidine) as judged by nurses did not agree with the accepted pharmacological profiles of these drugs. They report optimum doses for morphine were underestimated at less than 10mg by 26% of nurses. The figures for underestimating Pethidine are more complex because they cite the optimum dose as 80-100mg, whereas standard doses in this range are 75 or 100mg. If 80mg is taken as the lower value, 65.1% of nurses underestimated the optimum dose. The figures are somewhat different if 75mg is taken as the lower value, when only 4.5% of nurses underestimated the optimum dose. The exact responses of nurses for duration of action is not clear, except for both drugs 10% of nurses overestimated the duration of action at more than 4 hours. A leading article in the Lancet(1976) stated that the sparing use of strong analgesics postoperatively was based more on tradition than well reasoned principles. This seems to be supported by the findings of Porter & Jick(1980). They

reviewed 11,882 medical patients who had been on at least one narcotic in hospital. There were 4 cases of addiction, (0.03%), considered major in only one case. However, the extent to which this can be extrapolated to surgical patients is unclear. Nonetheless, this finding, interpreted as a risk of addiction of less than 1%, was applied to surgical patients by both Cohen(1980) and Weis et al(1983). Both used similar vignettes of a patient receiving Pethidine 100mg every four hours for 1 week (Cohen) or 10 days (Weis et al). Cohen found 68.4% of her sample overestimated the risk as more than 1%, and concluded, "nurses grossly overestimated the addictive potential of narcotic analgesics." p273. The findings of Weis et al revealed even higher figures, with 84.1% of the 57 doctors and 81.3% of the 70 nurses in their study overestimating the risk of addiction at more than 1%. It seems likely this would contribute to inadequate pain relief.

The prescribing and interpretation of orders for painkillers seems to be an important factor in pain management. Sriwatanakul et al(1983b) found physicians prescribed drugs in doses that were often inadequate, to be given at inflexible time intervals. Even if an adequate dose and flexible interval are prescribed, there may still be problems. An 'adequate' dose is hard to define. McQuay et al(1982) argue relief obtained from a standard prescription ranges from complete to negligble. This is supported by Austin, Stapleton & Mather(1980) who, in a small study of nine patients, found that intermittant intramuscular Pethidine lead to variable pain control due to inadequate, fluctuating and unpredictable blood concentrations. This emphaises the need for the nurse to evaluate the effectiveness of any analgesic drug. Flexible time intervals seem to give the opportunity to tailor pain relief to the needs of the patient. However, this is not always the case. The incidence of pain in 170 children recovering from surgery was surveyed by Mather & Mackie(1983). They concluded that although 90% of painkillers were ordered on a pro re nata (PRN) or 'as required' basis, these prescriptions were often interpreted as meaning "as little as possible."

This may partly contribute to poor pain control.

2.1.9 Can This Be Improved?

McGuire(1981) says the location, quality, intensity and onset of pain, as well as patients views on controlling and precipitating factors should be taken into account. A careful assessment of the patient is essential and should be a continuous process.

Strauss et al(1974) conclude that whilst "most aspects of pain work are peripheral to the attention and responsibities of the staff" and as "..the staff is not genuinely accountable for much of its interaction with or behaviour toward patients in pain.." p566, there will be little improvement in nursing care of patients in pain.

Pain seems to have a low priority in nursing care. It is not a direct threat to life, and professional accountability for the quality of life is less than for more tangible measures, such as recording observations or changing a dressing. McCaffery(1979) points out that nurses are rarely accountable for the treatment of each of their patient's pain, but they are expected to control the patients expression of pain, and the patient may fulfil this role by being 'good' and exhibiting 'self-control' by decreasing expression of pain: this, however, does not mean the patient is not IN pain.

2.2 THEORIES OF PAIN

Many theories of pain exist to explain the physiological and/or emotional basis of pain, and their progression has been summarised in detail by Dallenbach(1939), and more recently by Melzack & Wall(1982). However, four major theories will be outlined here.

2.2.1 Specificity Theory

The concept behind this theory was described by Descartes(1662). He proposed the pain system was a straight through channel from the periphery to the brain and summed this up saying, "...just as by pulling at one end of a rope one makes to strike at the same instant a bell which hangs on the other end." p265. This concept was developed into the specificity theory by von Frey(1895) who proposed that a specific pain system carried messages from pain receptors in the skin to a pain centre in the brain - each sensation had its own receptor which responded to a particular stimulus. This concept developed from the concept of a single sense of touch or feeling, onto one of four types of cutaneous receptors; warmth, cold, touch and pain, each having its own type of specific nerve ending. The spinothalamic tract which ascends in the anterolateral cord became known as the pain pathway. The thalamus was held by some to contain the pain centre.

In summary, specific pain receptors, comprising free nerve endings, in the body tissue project via pain fibres (Aδ and C fibres) and a pain pathway (lateral spinothalamic), to a pain centre (thalamic nuclei) in the brain.

However, this theory does not provide the entire answer: potentially painful stimuli do not always cause pain to be felt. Phantom limb pains and failure of surgical intervention to relieve pain contradict the assumption of a direct relationship between stimulus and pain. This concentration on purely sensory pathways is described by Melzack & Casey(1968) as, "an historical accident."

2.2.2 Pattern Theory

This theory, described by Goldscheider(1894), is also known as the Summation theory. In its earliest form it was known as the Intensity Theory and held that every sensory stimulus was capable of producing pain if it reached sufficient intensity. It denied the existence of specialised receptors and central neurons. Once a stimulus passed a certain threshold pain would be felt, and a stimulus of any kind, if great enough, would result in pain. Stimulus intensity and central summation are seen as the critical determinants of pain. Particular patterns of nerve impulses that evoke pain are produced by the summation of skin sensory input at the dorsal horn cells.

Pain results when the total output of the cells exceed a critical level as a result of either excessive stimulation of receptors normally fired by non-noxious thermal or tactile stimuli, or pathological conditions that enhance summation of impulses normally produced by non-noxious stimuli. Pain is thus seen to travel along ordinary sensory stimuli routes, rather than along specific pain pathways. The pattern for pain is produced by intense stimulation of non-specific receptors.

However, the pattern theory is a combination of several similar concepts which lack unity and clarity. This theory does not recognise physiological specialisation nor does it specify the kinds of patterns related to pain.

2.2.3 Affect Theory

This older theory dating back to Aristotle describes pain as an emotion rather than a sensation. Traditionally, the most well known of its proponents were Aristotle and Plato. Plato saw pain and pleasure as being perceived in the heart as a result of actions and reactions in the atoms of the body. There was no clear border between the psychic and physiological basis of pain and pleasure. He saw the soul as having within it, ..."passions

both fearful and unavoidable - firstly pleasure,... next, pains, which put good to rout;..." Plato, published (1929). Aristotle also viewed pain as a passion of the soul. He recognised that, "where there is sensation, there is also both pain and pleasure...", Aristotle, published (1968), but he postulated pain was due to unduly violent forms wave motion, caused by intense touch, sound or other sensory bombardment. He thought these effects took place in the heart. So the view developed that pain was an emotional experience rather than a sensation.

All of these theories explain some aspects of the pain experience, but none adequately explain the whole picture.

Another theory that has drawn on all these theories in an attempt to provide a fuller explanation of pain mechanisms is the Gate Theory, proposed by Melzack and Wall(1965).

2.2.4 Gate Theory

Melzack & Wall(1965) argued that the transmission of information resulting from a potentially painful stimuli could be modified by a gating mechanism. They proposed that this is mechanism was situated in the substantia gelatinosa of the dorsal horn in the spinal cord. This gate could increase or decrease the flow of nerve impulses from peripheral fibres to the central nervous system(CNS). If the gate is open, impulses flow through easily, when it is partially open only some impulses get through, and when it is shut no impulses get through: no pain is felt. The degree to which the gate is open or closed to sensory transmission is determined by activity in large diameter (Aβ) and small diameter (Aδ and C) fibres and by descending influences from higher centres. Aβ fibres transmit touch, whilst Aδ and C fibres transmit pain messages. The Gate Theory relies on complex neurophysiology which is probably more complex than at first thought, and Wall(1978) restated some parts of the theory to clarify and extend it. However, this theory provides a foundation for futher discussion and an

explanation of psychosocial influences on pain. This encourages a more comprehensive treatment of pain by considering motivational and cognitive processes involved in the pain experience, as well as the sensory processes. Figure 1 summarises this theory.

Melzack & Wall(1965) contend that central transmission to the brain depends on activation of transmission (T) cells by large or small nerve fibres; the amount of transmission from the fibres to the T cell and thus to the brain being governed by the substantia gelatinosa. The T cells activate neural mechanisms which comprise the action system responsible for response and perception. The substantia gelatinosa is activated by large fibres (mainly those from the dorsal columns of the spinal cord, concerned with touch), which shut the gate, and is inhibited by small fibre activity (concerned with pain generation) which open the gate. Normally activity of the large fibre system predominates, the gate is shut and T cell transmission is inhibited. Even when there is no noxious stimulation, there is a low but constant rate of activity in the small fibres, leading to a state of readiness to transmit when the number of nerve impulse is increased by noxious stimulation.

The higher centres can inhibit or facilitate the transmission of impulses. Afferent patterns in dorsal columns partly act as a central control trigger, activating selective brain mechanisms that influence the modulating properties of the gate system. The dorsal column provides a direct route to the thalamus and somatosensory cortex, conducting information about the nature and location of the stimulus very rapidly. Cells in the brainstem, including those in the periaqueductal grey and nucleus raphe magnus, exert powerful inhibitory effects on transmission from afferent fibres to T cells, and these act primarily on inputs evoked by injury or noxious levels of stimulation.

This theory then proposes that pain phenomenon are determined by interactions between cells in substantia gelatinosa, dorsal column fibres and the T cells.

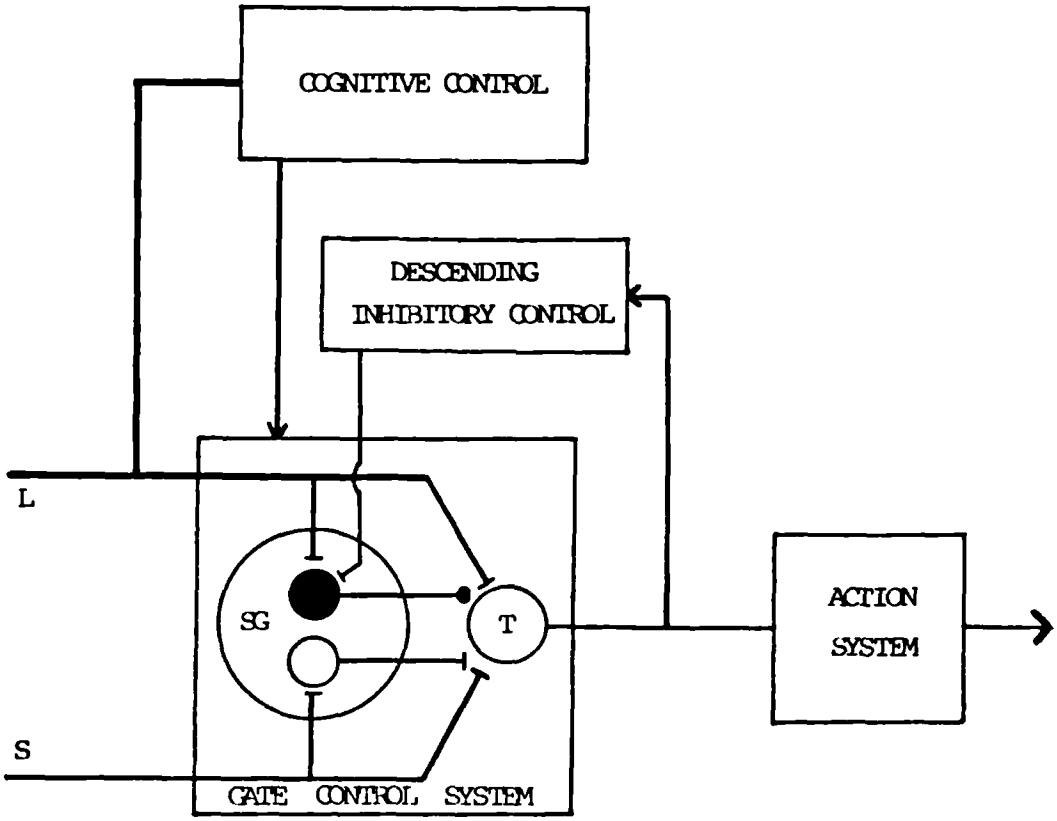

FIGURE 1. The Gate Control Theory of Pain.

L, large diameter fibres; S, the small diameter fibres. The fibres project to the substantia gelatinosa (SG) and the first central transmission (T) cells. The inhibitory effect exerted by SG on afferent fibre terminals is increased by activity in L fibres and decreased by activity in S fibres. The ventral control trigger is represented by a line running from the large fibre system to the central control mechanisms; these mechanisms in turn project back to the gate control system. There are excitatory (white circle) and inhibitory (black circle) links from the SG to the T cells, as well as descending inhibitory control from brainstem systems. The round knob at the end of the inhibitory link implies its action may be presynaptic, postsynaptic or both. All connections are excitatory, except the inhibitory link from SG to T cell. When output of T cells exceeds a critical level, it activates the action system - those neural areas which undertake the complex, sequential patterns of behaviour and experience characteristic of pain.

FROM MELZACK & WALL(1982) P226 and P235

2.2.5 Implications Of The Gate Theory

This theory casts doubts on the idea that pain is a simple sensation subserved by direct transmission to the pain centre, as it encompasses the cognitive, affective and sensory processing components of pain perception. Information about the location, magnitude, and spatiotemporal properties of noxious stimulation is transmitted and integrated with motivational tendencies towards escape/attack and cognitive information based on analysis of past experiences, and probable outcomes of different response strategies, all of which can influence the response to noxious stimulation. Melzack & Wall(1982) argue past experience, anticipation, culture and anxiety are all able to modify the pain experience. This variable link between injury and pain was demonstrated by Melzack, Wall & Ty(1982), who investigated 132 patients with acute pain in an emergency clinic. They found 37% of patients had no pain at the time of injury, whilst 54% of patients with skin injuries and 28% of patients with deep tissue injuries had experienced a pain free period. They concluded that the relationship between pain and injury was highly variable and complex.

The principles of the Gate Theory have been applied to nursing patients in pain by McCaffery(1979). At the spinal cord level, pain can be reduced by closing the gate via an increase in large diameter fibre activity; for example, by massage or vibration. At the brain stem level the gate can be closed by encouraging inhibitory impulses; for example, by creating sufficient sensory input, via distraction or guided imagery techniques. A monotonous environment should be avoided as this will lead to insufficient sensory input, facilitating brain stem impulses and an opening of the gate, increasing pain. In the cerebral cortex and thalamus, inhibitory impulses can be generated by, for example, decreasing anxiety by teaching how pain may be relieved and when it will end, giving the patient a sense of control over pain. Higgins, Tursky & Schwartz(1971) showed mild tactile stimulation reduced the nociceptive quality of electrical shock, and concluded this occurred only when a spinal

gating effect was produced.

However the Gate Theory is incomplete, and Nathan(1976) outlined some criticisms. He argues that three parts of the theory are hypothetical propositions, not fact. These are 1) the properties and functions of the T cell, 2) that small fibres inhibit whilst large fibres excite neurons of the substantia gelatinosa, and 3) the activation of central control by the fast conducting system prior to arrival in the brain of the more slowly conducting pathway. He continues, "The actual location and actual mechanism proposed by Melzack & Wall are wrong." p140. He supports this statement by arguing that in pathological states, if all large diameter fibres were destroyed, all stimulation would be painful and constant pain likely. Conversely, if all small fibres were destroyed, there should be no pain, however clinical evidence contradicts this. Iggo(1972) and Schmidt(1972) both make specific criticisms about the actual wiring of the system.

Kim(1980) felt the psychological dimensions of the theory were so rudimentary as to render the theory weak operationally, empirically and pragmatically. The theory did not delineate what and how psychological variables affected which activity, with what results. However, Sternbach(1968) argues the theory makes appropriate allowances in central control mechanisms for psychological processes like affect and attention, but, "...quite appropriately these are only allowed for and not spelt out." p43.

Cervero & Iggo(1980) describes two schools of thought on the role of the substantia gelatinosa, 1) as a receiving station and relay nucleus for primary afferent fibres, and 2) as a nucleus of interaction and modulation of afferent sensory information. The gate theory would seem to support this second school of thought. It seems however, that what happens when afferent fibres deliver impulses to the dorsal horn is more complicated that first thought.

Chapman(1985) uses the concept of the gate theory, to provide a multidimensional model for acute pain. The debate over exact mechanisms of

transmission is avoided by presenting a conceptual model only; not a detailed description of the exact mechanisms involved. This multidimensional model is illustrated in figure 2. This model describes emotion as a major dimension of pain. Nociceptive signals are integrated with emotions, beliefs, expectations and the social demands of the present situation.

Both the gate theory and Chapman's(1985) model for acute pain allow for the influence of many variables in modulating the pain experience. The main limitation of these approaches is that whilst an experience can be explained retrospectively, these models have no predictive power: the relative importance of the many variables is unknown, and probably different for each individual.

Perhaps the most useful approach in using theories of pain is summed up by Pilowsky(1978) who stated that to "fully understand pain will require us to tolerate life in a house of many paradigms." p216.

If a multidimensional model is used to explain acute pain, this encompasses the many influences on pain, including, for example, personality variables, cultural influences and learned responses to pain. As pain perception cannot be defined in terms of stimuli alone, it is important to recognise other factors that may influence reactions to pain. This recognition would realise the potential of these influences to be manipulated in an attempt to reduce pain. Some of these factors will now be examined.

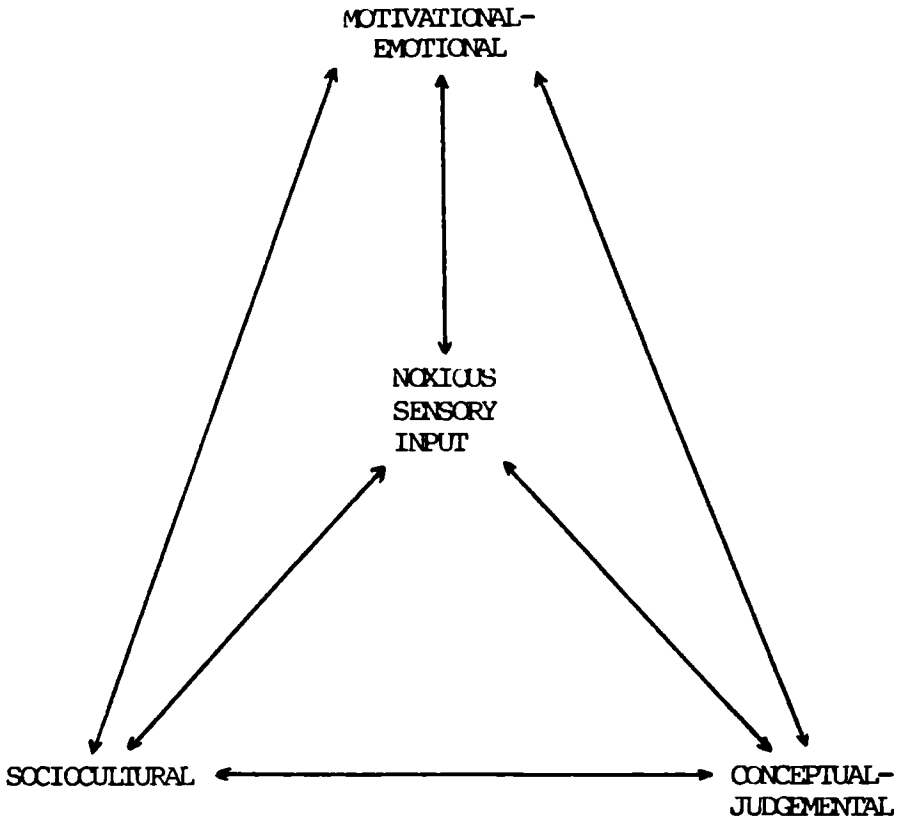

FIGURE 2. Chapman's Multidimensional Model For Acute Pain.

Neurological signals from injured tissue are integrated with emotional, arousal and thought processes to produce a perceptual experience that is modified further by social influences.

FROM CHAPMAN(1985) p24

2.3 Factors Influencing The Pain Experience

Introduction

The transmission and processing of sensory signals has been considered, now cognitive and psychological factors that influence the pain experience will be discussed, bearing in mind, as Sternbach(1968) outlined, that the response to pain is often so complex that arbitary categories are used to make sense of the data, and all catergories overlap. Pain has been described as the result of a lifetime of experience, including cultural and religious influences, learned responses to pain, resources for coping with life, and a person's psychological make-up, Sweeney(1977). Any of these factors can modify the pain experience.

2.3.1 Anxiety

a) Introduction

Freud introduced the concept of anxiety from a psychological perspective in the late nineteenth century. He called it, "something that is felt" and stated, "Its unpleasurable character seems to have a note of its own..." and "...is accompained by fairly definite physical sensations." Freud(1959) p132. Thus Freud saw anxiety as unpleasant and as producing physiological reactions. May(1950) defined anxiety as a "diffuse apprehension" and as, "the apprehension cued off by a threat to some value which the individual holds essential to his existence as a personality." p190. Many papers have since been written and scales devised to measure anxiety. This is partly because as Shipley, Butt, Horwitz & Farbry(1978) argue, anxiety is a multidimensional construct that may be reflected in physiological response, observable behaviour and self-report. So, like pain, anxiety is difficult to define and measure.

Anxiety has been described by Spielberger(1966) as having state and

trait components. Anxiety state is a transitory emotional state, that varies in intensity and fluctuates over time. It is characterised by feelings of tension, nervousness, worry and apprehension. Anxiety trait is a relatively stable personality disposition, reflecting individual differences in anxiety proneness. It represents the tendency to respond to situations perceived as threatening with increased anxiety state. Those with high anxiety trait, in general, have anxiety state elevations more frequently than low anxiety trait individuals, as they react to a wider range of situations as dangerous or threatening.

b) The Difference Between Anxiety and Stress

For the purpose of this study, Spielberger's(1979) interpretations of these concepts were used. He describes stress as, "...initiated by a situation or stimulus that is potentially harmful or dangerous (stressor)." An anxiety reaction occurs when, "...a stressor is interpreted as dangerous or threatening..." p17. This was summed up by Levitt(1980) who contends stress refers only to the stimulus, the subsequent response to which might be anxiety.

c)The Effects Of Anxiety

Physical Signs

Wilson-Barnett(1979) states that sympathetic nervous system arousal accompanies anxiety, this includes an increase in muscle tension, restlessness and incoordination. Prolonged anxiety can cause flushing, sweating, anorexia, hyperventilation, palpitations and diarrhoea.

Psychological Signs

Lazarus & Laurier(1978) argue emotions such as anxiety can be distressing. Anxiety may also interfere with adaptive functioning, serving

as a distraction or producing selective attention, thus decreasing the normal range of cue utilisation.

d) Anxiety In Hospitals

Admission to hospital is itself anxiety provoking, Wilson-Barnett(1979), and surgery futher increases this anxiety, Scott, Clum & Peoples(1983). Events which generate anxiety for patients having surgery were described by Chapman(1985) as fear of losing control and as uncertainty. Lazarus(1966) provides an even more comprehensive list of conditions which produce stress. These include: 1) uncertainty about physical survival, 2) uncertainty about the maintainence of one's own identity, 3) inability to control one's enviroment, even a little, 4) inability to avoid pain and privation, 5) genuine danger combined with pressures conflicting with withdrawal from the situation, 6) disruption of community life, 7) loss of loved ones and 8) the warning that this disruption and loss might occur. Although Lazarus derived this list from studies of extreme situations and responses, such as concentration camps, combat neuroses and disasters, each one of them could apply to hospitalised patients undergoing surgery. Whether or not these stresses result in an anxiety response would vary between patients. Other factors involved in hospitalisation which could be anxiety provoking are outlined by Chapman(1985) and include being in strange surroundings, the disturbance of usual rhythms and habits, the administration of drugs not normally used, social interaction with strangers and uncertainty. Bonica(1983) states, "It has been impressively shown that admission to hospital produces anxiety and stress that will highly correlate with the incidence of postoperative pain." pl71, although he does not provide any references to support this claim. He goes on to call anxiety, "the cardinal psychologic component of postoperative pain." pl77. Johnston(1980) suggested that anxiety may be an important predictor of physical and psychological distress which may influence the

success of the surgical procedure that originally elicited the anxiety. The literature reviewed thus suggests anxiety in hospital seems to be commonplace, and may influence pain perception. This possible influence on pain perception will now be examined.

e) The Association Between Anxiety and Pain

Research findings looking at the effects of anxiety on pain have shown mixed results. Sternbach(1968) maintains, "All that is necessary for maximising pain responses is that anxiety responses also be great." p25. Some research supports this contention. In a study of 67 patients undergoing abdominal surgery, Chapman & Cox(1977), who assessed pain using a rating scale and a 20 item questionnaire, found high anxiety trait was associated with more pain. This finding supported the earlier work of Martinez-Urrutia(1975) who investigated 59 male patients before and ten days after surgery. Patients with high anxiety trait were found to have more pain before and after surgery than those with low anxiety trait scores. Pain in this study was assessed using sensory pain scores from the McGill Pain Questionnaire, (see page 111). In both these studies anxiety trait was assessed using the State Trait Anxiety Inventory. Some studies have assessed neuroticism (N) using the Eysenck Personality Inventory rather than using the STAI to assess anxiety trait. Anxiety trait and N were found to correlate well, 0.62, by Loo(1979). Authors assessing N have found a relationship between it and pain. For example, Jacox & Stewart(1973) studied 31 surgical patients undergoing hernia repair and cholecystectomy. They found N was positively related to pain intensity as rated on the McGill Pain Questionnaire present pain intensity scale, (see page 111). The higher the N scores, the higher the patients' pain scores. Similarly, Parbrook, Dalrymple & Steel(1973), who studied 100 patients undergoing upper abdominal surgery, found postoperative pain correlated with N in male patients. This correlation was not significant for female patients. A

visual analogue scale (see page 99), was used to assess pain in three of the four studies considered by Boyle & Parbrook(1977). They found N correlated with pain when data from 190 patients in four different trials was grouped together.

Pain assessment was approached from a different angle in a study of 30 patients undergoing elective surgery by Lim, Edis, Kranz, Mendelson, Selwood & Scott(1983). They used the amount of morphine given in the first 48 hours after surgery to reflect levels of pain. Neuroticism was positively correlated with the amount of morphine given in the first 48 hours after surgery. In a study of 52 patients with advanced carcinoma of the cervix, Bond(1971) assessed extroversion (E) as well as neuroticism (N). Pain was assessed on an analogue scale, and whether patients communicated this pain to nurses was assessed by reference to analgesic charts. He found those who were pain free and not receiving analgesics tended to have low N and high E scores. He interpreted this as reflecting low emotionality coupled with the potential to communicate freely. The patients who had pain, but were not receiving analgesics tended to have high N and low E scores, indicating an increased emotionality and a tendency not to communicate this distress. Those patients with pain taking analgesics had high E and high N scores. It seems highly anxious patients may have more pain, but whether pain relief is obtained may depend on the patients ability to communicate. Schumacher & Velden(1984) point out there is an assumption that anxiety causes increased pain and not merely the inclination to report it. The nurse should therefore be alert to patients not likely to communicate their pain.

However, not all research supports the contention that anxiety influences pain. Bruegel(1971) in a study of 85 surgical patients found no relationship between anxiety-trait (as measured on the Institute for Personality and Ability Testing (IPAT) anxiety scale), and pain perception as rated on Chambers Price Pain Scale. A study of 100 general surgical patients by Cronin, Redfern & Utting(1973) revealed N did not correlate with

complaints of pain or number of analgesics taken. Johnson et al(1971) investigated 62 patients undergoing elective abdominal surgery and 18 undergoing a cholecystectomy. Data on 14 patients was discarded as it was incomplete. Patients were visited preoperatively, on the first postoperative morning and on their fifth postoperative day. Situational anxiety was assessed using a 30 item mood adjective checklist. Preoperative fear was found to be unrelated to doses of analgesics and recovery speed. Scott et al(1983) also found preoperative anxiety state did not predict the number of postoperative analgesics administered, which they used as an index of recovery.

There are studies which use the number of analgesic doses administered as either an indicator of postoperative recovery, or as an indicator of pain experienced. However, the number of analgesics given does not necessarily accurately represent recovery or the amount of pain experienced. For example, ward policy, nurses attitudes, doctors attitudes, patient acceptance of analgesics or nursing routines can all affect the number of doses administered.

f) Association Between Anxiety and Recovery

Wilson-Barnett & Carrigy(1978) found patients with high anxiety-trait scores tended to perceive events as stressful or threatening. This could retard recovery if the patient becomes worried and hesitant to ambulate after surgery, thus increasing the risk of stasis complications. Preoperative fear was found to have a linear negative correlation with recovery by Sime(1976), who investigated 57 women undergoing abdominal surgery. A study of 97 patients undergoing abdominal surgery by Egbert, Battit, Welch & Barlett(1964) suggests the existence of a linear relationship between anxiety and recovery, as assessed by length of stay. A decrease in anxiety, led to a better recovery after surgery. This finding was partly supported by Hayward(1975). He conducted a study with 68 surgical

patients and found anxiety was significantly and negatively correlated with length of stay. However, he failed to replicate this finding in the second part of this study involving 66 surgical patients.

A slightly different relationship between preoperative anxiety and postoperative recovery was proposed by Janis(1958), who found not a linear but a curvilinear relationship: the patient who displayed a moderate degree of anticipatory fear before physical stress stimuli (such as an operation or postoperative pain), was likely to have a better recovery than the patient with very low or very high preoperative fear. Janis did add that the low anticipatory fear group had a high incidence of subsequent reactions of anger and resentment if exposed to severe stress (for example, severe pain), but if the stress was mild the findings were very similar to those of the moderate fear group, giving a more linear relationship between anxiety and recovery. Janis' explanation for the curvilinear relationship is that people with low preoperative anxiety do not engage in cognitive preperation and become angry and resentful when faced with postoperative discomforts. The highly anxious patient has unrealistic fears and stays fearful. Janis pointed out that the three groups of high, moderate and low anxiety were not discrete groups, but represented trends that predominated within a given region of a continuum. In every aspect of postoperative adjustment the three groups widely overlapped.

This curvilinear relationship has not been strongly supported by research findings. Auerbach(1973) did find patients with moderate anxiety state scores expressed more positive feelings about hospitalisation than patients with high or low anxiety state scores. These scores were derived by looking at the elevation of anxiety state compared to normal. Normal scores were taken as those on the sixth postoperative day when the patient had been told by the doctor they were free of complications and recovering well. However, positive feelings about hospitalisation cannot, in isolation, be taken as a measure of recovery. Johnston & Carpenter(1980) in a study of 73 patients, supported at best a weak linear relationship between preoperative

anxiety and postoperative emotional state. They found generally no significant relationship between preoperative anxiety and measures of postoperative outcome other than mood, and no support for a curvilinear relationship. Patients with low preoperative anxiety did have slower recovery rates than patients with moderate anxiety. They concluded preoperative anxiety may not be an appropriate variable for exploring changes in later outcomes. They stated that any relationship between preoperative anxiety and postoperative outcomes, if it exists, must be weak. Ray(1982a) also concluded that prediction of postoperative adjustment on the basis of preoperative anxiety alone would be unlikely to be reliable in view of the complexity of the relationship. It would seem then, that postoperative assessment of anxiety may be advisable.

The different measures used to assess pain, anxiety and recovery confound the problems of interpreting these sometimes conflicting findings.

g) The Trajectory Of Anxiety In Hospital

Research findings pertaining to the pattern that anxiety levels follow in hospital appear to be mixed. In a study by Auerbach(1973), anxiety state scores forty-eight hours after surgery were lower than preoperative scores. Wolfer & Davis(1970), using a moods and feelings inventory, Spielberger, Auerbach, Wadsworth, Dunn & Taulbee(1973) and Martinez-Urrutia(1975), both using the state scales of the State Trait Anxiety Inventory, all found higher anxiety state levels before than after surgery. This was not supported by Chapman & Cox(1977) who found anxiety was highest on the second day after elective abdominal surgery. When they divided this data into low and high anxiety groups, the low anxiety groups were most anxious on the second postoperative day, after which their anxiety declined. For the high anxiety groups, anxiety remained high and increased after day five. However, the number of highly anxious patients still in hospital after day five decreased from seventeen to nine, indicating that perhaps the more anxious

patients remained in hospital, creating an apparent rise in anxiety levels. They also found a link between immediate postoperative pain and prolonged postoperative anxiety. Johnston's(1980) work supports these findings. She examined the natural course of anxiety before and after surgery using the State Trait Anxiety Inventory (STAI) in three studies relevant to the present study involving surgical patients. The first study involved 20 patients undergoing orthopaedic surgery. Each patient was visited each afternoon from the day of admission (two days before surgery) until the fifth postoperative day, omitting the day of the surgery: a total of seven visits. The STAI was completed at each visit, and by the patient alone on the intervening mornings. The data from the morning inventory had many missing values, so only afternoon scores were included in the analysis. Analysis of variance revealed no significant change in anxiety scores over the days for males or females or both combined. Subjects were found to have elevated anxiety levels after surgery which remained high for several days. An explanation postulated by Johnston for the continued elevation of anxiety state was that the success or failure of this surgery could not be determined for some time after surgery, until plaster casts were removed and mobilisation attempted. In order to explore preoperative anxiety further, the second study involving 21 female patients udergoing major elective gynaecological surgery was undertaken. Complete data from four days before to four days after surgery, excluding the day of surgery, and data from an assessment made between three and seven days after discharge were presented. Following admission, there was no significant change in anxiety levels from the day before surgery to four days after surgery. The third study investigated 72 patients undergoing major elective gynaecological surgery. These patients were visited at home, on average four days before admission. They were also visited on admission, then two, six and fourteen days after surgery. The final interview was carried out in the patients home if they had been discharged. Patients were asked to complete the STAI on the

days they were not interviewed. Pre-admission anxiety scores were not significantly different to those on admission. There was a significant difference between the two preoperative and the three postoperative assessments. There was no significant difference between anxiety scores on admission and on the second postoperative day. There was not then, a marked decline between pre and postoperative anxiety scores. These differences only became significant on the sixth and fourteenth days. Johnston concluded there was no simple reduction in anxiety scores from before to after surgery.

h) Why These Conflicting Results?

Conflicting research results are partly caused by methodological differences between studies, due to different scales used to assess anxiety, heterogenity of sex and operation, utilistation of a variety of outcome measures and subjects being assessed over different time periods.

i) Is Anxiety A Unitary Concept?

Anxiety, like pain has only been considered as a unitary concept, but this is considered by some too simplistic an approach. Ray & Fitzgibbon(1981) argue anxiety should be divided into two components which should only be treated as similar if anxiety as a general activation state is being investigated. If individual adaptation and the outcome of a situation are being studied, then the two components should be regarded as distinct, they are: first, an emotional response to danger and second, a coping response to that threat. In a study of 36 surgical patients, Ray & Fitzgibbon(1981) found arousal or coping rather than stress promoted adjustment; postoperative outcomes were related to preoperative coping rather than preoperative emotionality. An emotional response to stress or a high stress score had negative implications for postoperative pain and affect, whereas a coping response to threat or a high arousal had adaptive implications. They concluded it was the 'work' an individual did in response to a threat that

constituted adjustment rather than the worry in which they engaged. The regulation of one side of the anxiety response, the emotional response, does not ensure regulation of the other coping response. Ray & Fitzgibbon(1981) argue that interventions which reduce the emotional response do not always affect indicators of instrumental behaviours or coping behaviours. It may not be sufficient to decrease an emotional response to ensure an individual will be able to minimise the impact of the experience on usual activities. This point was taken up by Wallace(1984) who described the perception of threat as eliciting two parallel and independent responses: An emotional and a behavioural response. Variables that influence emotional responses may not necessarily influence behavioural response. The lack of this distinction in studies discussed earlier may partly account for their mixed findings. It would seem that when investigating the outcome of a situation, as in the present study, patients need to be asked about coping as well as using a general measure of anxiety, so that both elements of anxiety described by Ray & Fitzgibbon(1981) are incorporated.

The main emphasis of the work of Lazarus & Launier(1978) includes coping and cognitive appraisal. The latter is an evaluative perception and continuously changing set of judgements about the significance of events for the person's well-being. This cognitive appraisal is termed primary appraisal, and the coping or evaluation of resources and options available to deal with it are known as secondary appraisal. These two types of appraisal correspond closely with Ray & Fitzgibbon's(1981) categories of emotional reaction and coping orientation.

When an event occurs, it can be evaluated via primary appraisal as 1) irrelevant with no implications in its present form, 2) as benign positive: all is well, no adaptation required and 3) as harmful: harm or loss having happened; anticipated or threat of such harm; or as a challenge. Evaluation of resources or secondary appraisal does not necessarily follow primary appraisal, nor is it less important than primary appraisal. Secondary

appraisal can be stored in memory before primary appraisal occurs, for example, noting the position of the cardiac arrest trolley on the ward. Knowledge can overcome a potential danger, and a threat is negated if the patient can cope with it. Through secondary appraisal, a threat can be viewed a) as hopeless, b) as encouraging hope via a challenge, c) by relying on others to cope, d) as mild, and e) by blaming others, Lazarus & Launier(1978). Coping consists of many specific acts and stages, most actions have some adaptive significance. Ways of coping include information seeking to provide a basis for action, direct action or inhibition of action to alter the situation, or what Lazarus & Launier call 'intrapyschic modes'. These are all the cognitive processes that make the patient feel better, such avoidance, focusing on the past or future, or by focusing on self or the environment. Cognitive appraisal transforms the separate variables of the person and the environment into harm or threat or challenge, and directs the person towards available coping options. Miller & Managan(1983) found that patients were less aroused when they were given information consistent with their coping style. They studied 40 patients having a colposcopy. Avoiders who received low information and information seekers who received high levels of information were less aroused.

2.3.2 Information

Information would seem important to help the patient cope with the situation. The rationale behind giving patients information preoperatively is to remove uncertainty: if the patient can anticipate rather than be the passive receipient of events, they can retain some control over the situation. Johnson(1973) maintains sensory information will allow a person to cope and reduce the negative impact of an experience on activities of daily living, as they have a map of the impending experience and a structure from which to predict and monitor the unfamiliar. It allows the individual to respond as if in a familiar environment. The amount of effort expended in worry and

organising the event into a meaningful context is reduced.

The diversity of research findings in this area seems to be due, partly at least, to the different types of information provided. Ridgeway & Mathews(1982) argue that standard information may leave specific worries unanswered, whereas coping information provides a general strategy that can be applied to any specific worries. Clum, Scott & Burnside(1979) argue information about surgery may sensitise the patient to the experience unless they have the information they need to cope with this information. So, not only do patients need to have information, about, for example, postoperative pain and discomfort, they also need to know what they and others can do to reduce this pain and discomfort. A more detailed review of this area has been made by Ray(1982a, 1982b) and Devine & Cook(1983).

2.3.4 Control

The patient can be viewed as relatively powerless in terms of pain control in hospital. Major surgery means the patient can be physically helpless for some days. They are in bed, often restricted by pain and can do little for themselves, which could be a source of stress.

Control is defined by Thompson(1981) as a, "belief that one has at one's disposal a response that can influence the aversiveness of an event", and this affects stress. Miller(1979) describes control as occurring when an individual can control aversive events and thus has a stable source of control. Lack of control can arise when this source is less stable. Relying on health professionals for the relief of pain could be seen as an unstable source of control. There is no guarantee that a future danger can be minimised: will pain relief be provided when it is needed? The feeling of control, or lack of it, could potentially influence well being, as demonstrated by Pennebaker, Burnam, Schaeffer & Harper(1977). They found a lack of control over noise bursts lead to the report of more physical symptoms than a group with this control. This confirms the work of Staub, Tursky &

Schwartz(1971), and Bowers(1968) who found those subjects with no control over the intensity and predictability of electric shocks judged less intense shocks as uncomfortable and tolerated less shocks than a control group. It seems perceived control over an event can reduce the aversiveness of noxious stimulation. Control or the ability to cope with events in hospital would thus seem to be important.

2.3.4 The Meaning of Pain

The meaning of pain for patients and the significance they attribute to it can affect their perception of that pain. For example, Beecher(1956) observed soldiers wounded in battle. He found no relationship between the extent of the wounds and the pain experienced by soldiers. He interpreted this as being due to the relief these men felt at being alive and away from battle: that is, the significance of the wound was important in determining pain. When Beecher compared these soldiers to civilians with similar surgically inflicted wounds, he found 83% civilians compared to 32% of soldiers wanted medication to relieve pain. Beecher explained this difference in terms of anxiety levels and attitudes of patients. The soldiers felt relief, whereas for the civilians surgery often represented a major personal event. Not only perceptions of pain, but the meaning of pain can thus be influenced by many factors, well illustrated by Weis et al(1983) who found that 30% of 66 postoperative patients saw pain as having some value, 54% did not and 16% were unsure of its value. Copp(1974) was more specific in her study of 148 patients: 26% viewed pain as having some value, 22% saw it as a struggle or fight, 13% as punishment, 11% as a challenge, 10% blamed themselves and 3% saw pain as a loss. The feelings of the remaining 15% are not specifically reported. These findings indicate the diversity of ways in which a painful experience can be interpreted. Copp(1985) developed her earlier findings and describes five "postures" which indicate the perception of pain and stance taken by the sufferer. These are 1) Pain as powerful and the coper as passive, 2) Pain as invading and the coper as combatant, 3) Pain as a reality and the coper as responsive, 4) Pain as cunning and the coper as reactive and 5) Pain as demanding and the coper as interactive.

These studies show specific differences in the meaning of pain between individuals. In further understanding these differences, the way in which a more general meaning of pain can be derived will now be discussed, followed by a review of more specific background influences.

Background culture provides, according to Illitch(1976), a system of meaning and pain tolerance by integrating pain into a meaningful setting and evolving skills in suffering. There are more global influences on the meaning of pain, which will now be considered.

a) Philosophical Meaning

Pain forces man to reflect on life as death does, indeed, Baken(1968) says "Pain is a harbinger of death." Baken argues it forces the question 'Does this pain mean I will die?' Szasz(1975) argues that pain shows how unfree, transitory and helpless we really are: Life without pain is a life of thoughtlessness.

b) Religious Meaning

The Christian approach to the meaning of pain is reflected in the Bible. Hebrews Chapter 2 verse 10 refers to being made, "perfect through sufferings." This is further illuminated by recent Papal teaching. Pope John Paul II(1984) in an Apostolic letter on suffering, repeatedly links suffering, including that caused by pain, with redemption, "redemption accomplished through suffering." p38, and, "each man in his suffering, can also become a sharer in the redemptive suffering of Christ." p39. Lewis(1940) writing about pain from a lay perspective linked pain with sanctification, described martyrdom as embracing pain as an integral part of the sacrifice. Lewis goes on to say that what is good in any painful experience is, for the sufferer, submission to the will of God, and for the spectator, the compassion it arouses and the acts of mercy to which it leads. Pain and suffering as sometimes described as a punishment for sins, although not necessarily for personal sins, but punishment's "...origin and existence are connected with sin." Joblin (1985) p7.

However, ten years before this Papal letter, MacNutt(1974) argued there was, "undue emphasis" on the benefits of suffering. He described Platonic

thought as having "infected" Christian spirituality. He felt this emphasis on suffering was "...more the influence of Roman Stoicism than the doctrine of the Church's founder." p61.

Despite alternative viewpoints, the current guidance from Rome is that through suffering, redemption is obtained. There seems to be a connection, however distant, between punishment of sins and suffering, and the idea that through suffering inner joy and ultimately redemption will be achieved.

The Buddist approach to pain is described by Tu(1980) as accepting pain as a defining characteristic of life and thus they develop a disinterested attitude towards it. Wordly pleasures are seen as trivial, and the experience of pain, properly understood strengthens the body, purifies the soul and deepens the spirit.

So both Buddist and Christian doctrines have a similar perspective of pain as having a positive value.

c) Scientific Meaning

With the decline of the importance and power of the church in Western civilisation, the values and ideals of science have tended to replace the churches doctrines. Illitch(1976) argues pain is no longer a personal matter to understand and suffer since Descartes divorced body and soul, and fostered the image of the body as a machine that could be repaired. Brena(1972) describes science as thinking that all questions and problems of human life, including pain, could be solved by proper understanding and application of the mechanisms of physical laws. Pain is now seen as an unpleasant event to be alleviated. The problem of pain is now how to combat it. Pain is no longer mystical, but has become medicalised, Illitch(1974). The technical nature assigned to pain deprives suffering of its personal meaning. It is managed by techniques and by doctors who are not geared to recognising any question marks the pain raises in the sufferer. Now pain perceived as curable is intolerable. Suffering is no longer seen as a symptom of health.

Illitch(1976) describes the present society as an "anesthetic society" and says, "Increasingly pain-killing turns people into unfeeling spectators of their own decaying selves." p160. Society ignores the reality of pain. Brena(1972) describes this as being "allergic" to pain. In a recent legal article by Smith(1984) this aversion to pain is illustrated. He says jurors are finding the issue of pain a "repugnant and frightening topic" p39, and that this repugnance was increased when the dimension of suffering was included.

d) Secular Meaning

Another perspective on the meaning of pain is outlined by Buytendijk(1961) who describes pain as the opportunity to test courage and character and as flattering one's self and the opinion others have of one. Intrinsic in Buytendijk's comments, is that to endure pain is good. However, he feels that these heroic attitudes arouse resistance, not suffering. Sacks(1982) doubts is pain makes one better, but feels it probably makes one more profound. Pain itself can be used by the sufferer. Szasz(1975) describes pain as having an important meaning and significance in some patients' lives. He outlines the game of 'Painmanship' where pain becomes a career for the patient who often has undiagnosed pain and unrelieved suffering. Szasz says whilst pain is usually seen as bad and to be combated or removed, at the same time, though less openly, it indicates to the superego, and others, that we are good. This secular perspective perhaps represents an integration and assimilation of the religious and scientific perspectives.

e) Integration of these Perspectives

Patients could be regarded as being somewhere on the spectrum between seeing pain as, "meaningless, questionless torture", Illitch(1974) p919, and feeling some benefit will come from it, for religious or other self

growth/self testing reasons. As Neal(1978) points out, even if the patient has no religion and its precepts are never uttered, it can be handed down from generation to generation in moral and social behaviour.

So, whilst medicine seems to advocate complete eradication of pain there are other influences which, although perhaps not openly recognised, operate against this 'ideal', and may create conflict in the health professionals as well as in the patients.

Sternbach(1984) feels "such viewpoints are of little use to the investigator as clinician or researcher - such a person needs to consider the biological and adaptive function of pain in an organism." However, if cultural and social background and past experiences are influential in the perception of pain, as the Gate Theory suggests, then looking at the milieu from which pain derives its meaning could be important in influencing the way patient (and the nurse and doctor) view suffering; whether as redemptive, a punishment, a test or as unbearable, or any combination of these. This is the background from which people operate, probably with influences of varying degrees from each perspective.

2.3.5 Background Variables

A review of more specific background influences will now be considered.

a) Cultural Influences

Cultural influences do not form a specific, predictable relationship with the patient's response to pain, but are factors associated with similarities and differences in reactions to the pain experience and to the acceptance of treatment for pain, Meinhart & McCaffery(1983). Although each cultural group has attitudes and behaviours it considers normal, there can be considerable differences between patients raised in the same culture, This may partly explain some of the conflicting results found in the literature. Zborowski(1952) studied the response of different cultural groups to pain.

Those from the 'Old American' stock (with at least Grandparents born in the United States of America, and who did not identify with a forgein group) withdrew to be alone in pain, and expression of pain was seen as private. They conformed to the 'ideal' behaviour pattern accepted by the dominant 'Old American' culture. Italian-Americans and Jewish-Americans expressed their pain openly, Jews being concerned about the long term effects of the pain on their health, the Italians being concerned with the actual sensation and wanted pain relief. Irish, like the Old Americans withdrew and suffered alone, although they would admit that they suffered. This findings that differences existed in pain behaviours between cultures was more recently supported by Madjar(1985), who looked at 20 Australians and 13 Yugoslavs undergoing abdominal surgery. A difference in underlying attitudes to pain was found. Anglo-Australians wanted to be alone, whilst the Yugoslavs wanted company.

The number of narcotic analgesics taken by surgical patients from different cultures was investigated by Streltzer & Wade(1981) who studied the first five days after surgery. There was no difference in narcotic consumption between those of Chinese, Japanese or Filipino origin, whilst Hawiaan and Caucasian patients had significantly more than these other groups, with Caucasians having the most. The authors query whether the former group had less pain or were more stoic. Miller & Shutter(1984) investigated 60 patients in acute postoperative pain. They found white patients made more pain disclosure statements and used more 'maximum intensifiers' than black patients. However as both the researchers were white, this may partly explain the reason for this difference in pain expression. The influence of group identity on pain was studied by Lambert, Libman & Poser(1960). They found Jewish patients increased their pain tolerance when they were told they could take less pain than protestant subjects, though not when they were told they could take more pain. Protestants increased their pain tolerance when they were told they could take less or more pain than Jewish patients.

Similarly, Buss & Portnay(1967) found group identity increased pain tolerance. However, Tursky & Sternbach(1967) found great intra group variability and overlap and concluded autonomic responses to painful stimuli could not be predicted purely on ethnic grounds.

The literature indicates culture may influence the way in which individuals express their pain. It is not only pain that is affected by culture. Weisenberg, Kreindler, Schachat & Werboff(1975) found it influenced anxiety trait levels. Puerto-Rican patients had the highest levels, then black patients with white patients having the lowest anxiety trait scores.

b) Social Modelling

The extent to which pain is tolerated by patients may be influenced by observing the behaviour of other patients. If others in the ward are maintaining a 'stiff upper lip', a new patient may tolerate more pain than if they were with intolerant patients. This social modelling is supported by the work of Craig & Weiss(1971). They found subjects viewing an inactive model tolerated a 6.30 milliamp(mA) shock, if they were with an intolerant model they tolerated 2.50mA and with a tolerant model they received 8.65mA before describing the sensation as painful. So the social context in which pain is reported is important.

c) Marital Status

Marital status was found by Bruegel(1971) to influence pain, with married people reporting less pain than single people, this possibly being due to support from the spouse. Cohen(1980) and Scott et al(1983) found marital status had no significant effect on reports of pain.

d) Age

Age was found to play an indirect role in pain levels by Bellville, Forest, Miller & Brown(1971), who found older people reported a greater relief

of pain from painkillers than younger people. This could be due to lower expectations of analgesic effect by older people, or that young people are less likely to have experienced severe pain and may not realise how intense the sensation can be. Limited past experience also reduces opportunities to develop coping strategies to deal with this pain. Donovan(1983) reported that dissatisfaction with pain relief was more common amongst younger patients (15-35 years). Younger patients in Hayward's(1975) study tended to receive more analgesics, and Nayman(1979) found younger patients tended to have more morphine than older patients over the first two days after surgery. Parkhouse et al(1961) in a study of over one thousand postoperative patients, found all patients under the age of fifty had analgesics after abdominal surgery. A retrospective study by Faherty & Grier(1984) of 772 patients who had undergone abdominal surgery found older patients had less analgesics prescribed and less administered in the first 48 hours after surgery. Loan & Morrison(1967) also found patients over 50 Years had fewer analgesics than younger patients This finding was recently replicated by Taenzer(1983). Younger people tended to obtain less relief from painkillers, and received more painkillers than older people. This could be interpreted as an intolerance or rejection of pain and suffering by younger people, or possibly reflect a higher pain tolerance in older people. However, Woodrow, Friedman, Siegelaub & Collen(1972) found pain tolerance to mechanical pressure decreased with age. Whether this difference would still be apparent with clinical pain is unclear, although the research evidence would suggest not. Pain was not found to be influenced by age in studies by Cohen(1980) and Scott et al(1983).

e) Sex

The findings about the influence of sex on pain are just as diverse. Woodrow et al(1972) found males had a higher pain tolerance than females, and Taenzer et al(1986) found female choleycystecomy patients had more analgesics than their male counterparts. However, other studies report no significant

differences between males and females: Cohen(1980), Scott et al(1983). The effect of sex on administration of painkillers found by Bond(1970) was interesting. Men made approximately twice as many requests for analgesics, but whereas men were frequently refused medication, females never were.

f) Siblings

Sternbach(1968) found the more siblings a person had, the more they complained of pain. This could be explained as a desire to gain attention and help when in pain, perhaps more difficult for a child from a large family.

g) Class

Sternbach(1968) found working class people were more likely to complain of pain, although willingness to complain of pain does not necessarily reflect a lower pain tolerance.

h) Personality

Craig(1978) described situational factors as more important determinants of pain behaviour than personality dispositions. Personality has however, been extensively discussed in relation to the experience of pain. Bond(1981) stated that emotional, perceptual and motivational factors of personality play an important role influencing pain. Bond & Pearson(1969) found patients with higher extroversion were more likely to complain of pain than introverts, even though introverts had more pain as assessed on a pain scale: extroverts communicated their pain more freely.

i) Field Dependence/Independence

Field independence involves the use of internal cues and is relatively uninfluenced by external characteristics. Field dependent people use external stimuli, tend to be passive and accepting, and pain perception tends to be magnified, as Wise, Hall & Wong(1978) found when they studied 37

patients having a choleycystectomy, although there was not necessarily a concomitant increase in analgesic consumption.

j) Augmenters/Reducers

Petrie(1978) has looked at this aspect of personality in detail. The concept is based on an estimate of magnitude. Those who consistently overestimate are augmenters, those who consistently underestimate are reducers. Reducers have an increased pain tolerance because they underestimate pain intensity. Moderates neither over nor under estimate magnitude. Petrie studied 19 subjects and found augmenters tolerated least radiant heat, then moderates, with reducers tolerating most. However, there were only six, six and seven subjects in each group in this study.

Taenzer et al(1986) found 46% of the variance observed in his sample was based on measures of personality trait and situational/affective/cognitive variables. However, this finding is not altogether suprising, considering the huge area covered by these variables.

k) Environment

This was considered in a study by Ulrich(1984), who studied 23 patients who overlooked a wall and compared them to 23 patients who overlooked a natural scene. Those patients overlooking the natural scene had shorter stays and fewer analgesics. However, this study was carried out retrospectively over ten years. There may thus be other explanations for this difference between patients. Dodson(1985) described pleasant ward surroundings, the distraction of other people, radio and television as playing an important part in the management of postoperative patients, "and may play an important part in pain relief and recovery." p196.

2.3.6 Nurses' Influences on Pain

If the nurse has a central role in providing pain relief, then the extent to which this role is fulfilled seems likely to influence the patients pain. If the nurse chooses to ignore patients in pain, consciously or not, patients are unlikely to obtain the pain relief they need. This section will be divided into two parts, first, nurses non-deliberate (sub-conscious) influences on pain and second, nurses deliberate (conscious) actions to influence pain.

a) Non-Deliberate Influences on Pain

The actions of nurses in providing pain relief for 15 postoperative patients were investigated by Newton, Hunt, McDowell & Hanken(1964). Each patient was observed continously for two hours by a research nurse, and interactions between the patient and the ward nurse during this time were also recorded by this research nurse. Observations of these patients revealed a total of 159 signals of pain, both verbal and non-verbal, 52 of which were not monitored: there was no ward nurse present when the signals were made. Of the remaining 107 signals which were monitored by the ward nurse, 56 did not result in any action being taken by the nurse and 51 elicited an active response. Verbal signals were more likely to elicit an active reponse than non-verbal signals, which tended to be followed by a passive (no) response. Whether a passive response meant the signal was not detected or was detected and ignored is open to speculation. This study indicated that of the pain signals made when the ward nurse was present, over half did not elicit a response. Non-verbal signals were more likely to meet with a passive response, arguably because they were more difficult to detect, or perhaps easier to ignore.

The way in which the nurses dealt with patients in pain was also observed by Bourbonnais & Mackay(1981) when they studied 12 patients in an intensive care unit who experienced 41 episodes of chest pain. All patients

received a pain medication, however, 56% of these interventions did not result in relief of pain as assessed using a 'pain gone', 'pain not gone' classification. Thus over half the interventions observed were ineffective. This study illustrated that even when the nurse intervened, the effectiveness of this intervention could not be assumed.

The interpretation of pain by the nurse may be influenced by other factors. For example, as already discussed, Fagerhaugh & Strauss(1977) concluded pain relief could be affected by the complexity of the nurse-patient and nurse-nurse relationship, as well as by workload and the organisational setting. Bond(1970) found requests by patients for painkillers lead to the least potent analgesic being given, whilst painkillers initiated by staff were more potent. This implied the nurse felt they, not the patient judged the patients pain. Some factors which may affect nurses inferences of patients suffering were the subject of several studies by Davitz & Davitz(1981). Their first studies looked at the effect certain patient characteristics had on nurses inferences of suffering. 'Inferences of suffering' was a general term used to encompass ratings of physical pain and psychological distress. To investigate the effect of socio-economic status inferences of suffering, 50 female nurses were asked to complete a 90 item questionnaire. Each item consisted of a vignette with information on the patients illness, gender and socio-economic status. Socio-economic status was divided into three groups by occupation of low, medium and high status. Patient occupation was mentioned in the course of the vignette, and gender was conveyed by use of the patient's name.

The nurse was asked to rate the degree of suffering each patient was likely to experience. For each item the nurse made two ratings, first the degree of physical pain they felt the patient was likely to experience, using a seven point scale from none to very severe, second, the degree of psychological distress on a similar seven point scale. It could be argued that by asking the nurse to rate the degree of suffering each patient was

likely to experience, the nurse was forced to generalise and perhaps to stereotype the patient. Also the extent to which responses to these vignettes would match what would actually happen on the ward, when the nurse would have potentially more information at her disposal, is unclear.

Nurses inferences of physical pain were consistently related to socio-economic status of the patient, with lower status patients generally inferred as suffering more physical pain than patients of middle or high status. Nurses inferences of psychological distress were not consistently related to the socio-economic status of the patient. The nature of the patient's illness accounted for a large part of variance in nurses inferences of both physical pain and psychological distress. The patients condition was thus found to be an important determinant of the nurses reaction to suffering. The socio-economic background of the nurse was not related to their inferences, but as most nurses were from lower middle and middle classes, the distribution was rather restrictive and may account for this lack of difference.

The influence of patients age on inferences of pain was investigated with a new sample of 65 female nurses, using the same procedure as before. Age groups represented in the vignettes were 4-12 years, 17-25 years, 30-45 years and over 65 years of age. Age had little influence on inferences of physical pain, but did influence inferences of psychological distress, with children rated as suffering less distress than other age groups.

Another sample of 132 nurses was selected to study the effect of the patients ethnic background on the nurses inferences of pain and psychological distress. The ethnic groups included were: Oriental, Mediterranean, Black, Spanish, Anglo/Saxon and Jewish. Ethnic background was found to be an important determination of inferences of pain and distress. In general, Jewish and Spanish patients were felt to suffer most, and Oriental and Anglo/Saxon the least.

Similar vignettes were used by Davitz & Davitz(1981) to construct a 60

item Standard Measure of Inferences of Suffering (SMIS). This had an odds-even split half correlation of 0.96 for both physical pain and psychological distress, and a test-retest reliability over one week of .89 for physical pain and .87 for psychological distress. This indicated the SMIS was internally consistent and stable over time. It was devised to study the range of differences between nurses, and the tendency of a nurse to infer high or low suffering, rather than central tendencies, on which their studies described so far had focused.

When the SMIS was administered to 76 black and 76 white nurses, a comparison of their ratings revealed no difference in the degree of physical pain inferred, although black nurses inferred more psychological distress than white nurses. These inferences were not influenced by the race of the patient.

A further sample of 94 nurses who completed the SMIS showed nurses tended to infer more suffering if they reported their own experiences as painful. The number of years of nursing experience, current nursing position and area of greatest nursing expertise were unrelated to inferences of suffering.

Finally in this series of studies to be reviewed here, 272 medical/surgical nurses completed the SMIS, and their scores were computed and arranged from lowest to highest inferences of suffering. The lowest and the highest 10% of nurses were identified and their interactions with patients were then observed. See Davitz & Davitz(1981) p137-141 for full details of the observation procedure. High inferers of suffering tended to stand closer to their patients, conveyed a warmer emotional tone and touched their patients more often, all significant at the 0.05 level. This indicated that nurses who inferred high suffering tended to behave differently from those who inferred low suffering, who tended to be more impersonal and distant in their interactions with patients. Davitz & Davitz(1981) concluded, "In short, their behaviour reflected and mirrored their beliefs about patient

suffering." p146.

The effect of nurses characteristics on inferences of patient suffering was also investigated by Mason(1981) who used Davitz & Davitz's(1981) SMIS. She found the educational preparation, current position, area of clinical practice, and age of the 161 nurses in her sample had no significant effect on their inferences of suffering. The length of the nurses experience had no significant effect on inferences of psychological distress, but nurses with less than one year's experience inferred more physical pain than those with six to ten years experience. This may have indicated a decrease in sensitivity to physical pain over time. Similar nurse characteristics were studied by Dudley & Holm(1984). They found there was no significant difference between 50 nurses' inferences of pain and psychological distress on the SMIS and years in practice, age, job satisfaction, educational preparation, clinical area or shift assignment. The only category to influence nurses inferences of suffering was the category of illness. These findings substantiated those of Davitz & Davitz(1981). However, Dudley & Holm(1984) also found nurses tended to infer less pain than psychological distress, and argue this may lead to inappropriate management if the patient experienced both pain and psychological distress.

The nurse must selectively perceive and interpret an enormous variety of complex and potentially important stimuli when assessing pain and its relief. This perception is based on beliefs about what is important in a given situation and the meaning of specific cues. Studies reviewed so far indicate the nurse may not always recognise or acknowledge pain signals, and the interpretation of these signals may be affected by patient characteristics, most notably the patients illness. The nurse, it would seem, needs to understand her own defensive reactions to the suffering of others if the care of patients in pain is to be individualised, and thus as Horsley(1982) stated, "know what is needed." p6.

b) Deliberate Influences on Pain

There is some support for the nurses ability to influence pain in a more direct and intentional way, with the aim of reducing pain. The studies discussed under non-invasive methods of pain relief (see pp 85 to 99), where nurses use methods such as relaxation, distraction and imagery to reduce pain also support this contention.

Studies not specifically focusing on alternative methods of pain relief will be reviewed here. McBride(1967) found pain relief was more effective if the nurse explored the character of the pain with the patient, and did not just automatically administer medication. A controlled experiment was used to test the "causal relationship" between interactions involving the nurse and the patient and the effect these interactions had on the patient. Pre and postoperative patients with complaints interpreted by the nurses to mean pain comprised the 21 subjects of the study. Each patient was considered only once, and was randomly assigned to one of three groups. The first of these groups was termed 'experimental nursing' where the investigator assessed what the patient meant by pain and ascertained their immediate physical, intellectual and emotional needs. The way in which this was achieved was not reported. The nurse then provided a nursing intervention and evaluated the resultant relief. Six of the seven patients in the experimental group received pain medication. In the second group, 'Control Nursing I', the patients complaints of pain were viewed by the nurse investigator as requests for pain medication, and any discussion of feelings was avoided. All patients in this group received pain medication. The third approach, 'Control Nursing II' was given by hospital staff and no limitations were imposed on their approach. All patients in this group received pain medication. Pain relief was assessed using tape recordings of verbal statements of improvement, as a decrease in pulse and respiration, and other changes in non-verbal behaviour, which were recorded by hand onto cards. Verbal statements were checked by a non-nurse judge, who scored relief as

'much, some, no relief, increased discomfort'. Pain relief as judged by non-verbal behaviour was rated by an independent judge as 'no, slight, moderate and great relief'. Despite these independent judges ratings, this area represented a weakness of the study in that the nurse investigator who administered the experimental and control treatments also elicited all the patients' verbal statements and completed non-verbal behaviour checklist. This introduced a potential source of bias.

The experimental group of patients were found to obtain significantly more pain relief immediately after the nursing care was completed, and tended to have better longer term relief one hour later, although significance levels at one hour are not reported. McBride concluded a "psychsomatic" view of pain was more effective in the relief of pain than one which interpreted reports of pain purely as requests for pain medication. However, given the limitations of this study already discussed, and the small sample size, this conclusion might be somewhat optimistic.

A larger study by Moss & Meyer(1966) of 50 patients found relief of moderate pain could be influenced without the use of painkillers, by planned nursing interventions. The exchange of responses between the nurse and the patient was the focus of this experimental study. The experimental group involved the nurse investigator walking to the patients bedside, looking at the patient, introducing herself, and asking the patient how they felt. No activity was initiated unless requested by the patient. The nurse and the patient then discussed pain relieving measures, and the patient decided on the measure to be used. Fifteen minutes later, patients were asked if there pain was "the same", "less", "more" or "gone". The control group varied only in that the patient did not decide on the pain relieving measure. A nurse observer watched these interactions to ensure this schedule was followed. As no data seemed to have been discarded, it must be assumed nurses did adhere to these schedules. Pre and postoperative patients who complained of pain were alternatively allocated to the control or experimental groups. Each patient

was admitted to the study only once. When this data was examined, in the experimental group one patient rated their pain as the same, twenty-four rated their pain as better, gone or they were sleeping, and none said it was worse. This compared to control group ratings of nineteen the same, none better/gone/sleeping and six worse. It thus seemed patients who had more control over the choice of pain relieving strategy obtained better pain relief than those without this control, and that nursing measures could be effective in providing this relief.

Specific nursing measures were used by Billars(1970) who investigated the effect of nurses suggestion on 30 post abdominal surgery patients. Patients were divided into three groups, 1) Patients were repositioned and the nurse suggested this would relieve their pain, 2) As for the first group, in addition patients were told further action would be taken if the measure failed, and 3) Patients were repositioned only. If a patient complained of pain, a nurse investigator went into the room and ascertained how the patient was feeling, 'where it hurt', obtained a description of the pain and a rating of the pain as 'a little bit of pain, some pain, quite a bit of pain or a lot of pain'. Ten minutes after this interaction the patient rated their pain again. Of the patients in the first group given positive verbal suggestion, nine of the ten had pain reduction. In the second group given assurance of further action, seven of the ten had pain reduction. Billars suggested this assurance may have inhibited the effects of positive suggestion. In the third group, only one of the ten patients had a reduction in pain. The extent to which the same nurse investigator administering the pain relieving measure and collecting the ratings of its effectiveness introduced a bias into this study is unknown.

The use of verbal suggestion was also studied by Chambers & Price(1967). They looked at the relationship between what was said when painkillers were administered and the pain relief obtained in 125 medical/surgical patients. They argued that if the nurse made a positive

statement about the effectiveness of a painkiller, patients would obtain more relief more quickly for a longer period of time than if the nurse made a distracting statement or said nothing. There were twenty patients in each group, and a further three groups of twenty, each of who received one of the three statements, but who were given a placebo, not a painkiller. A rating scale was used to assess pain which comprised nine different observations, (attention, anxiety, verbal, restlessness, muscle tenseness, facial expression, perspiration, sounds(grunts/moans) and nausea), each with a five point response category from almost complete to none. One nurse assessed the patient and administered the analgesic and/or nursing measure. A second nurse recorded pulse and respiration and completed the pain observation sheet prior to drug administration, every 20 minutes for one hour and then hourly for three hours. They found the differences between the groups were not significant and thus could not support the use of positive or distracting statements.

A different approach to the nurses' influence on pain was taken by Sofaer(1984). She looked at nurses' knowledge about pain and its relief and investigated the outcomes of 47 patients before (control) and 52 after (test) an educational programme for nurses involving ward based discussions. These patients underwent major elective surgery and were interviewed, on average, on the third postoperative day. They were asked to complete eight graphic rating pain scales retrospectively to record average pain intensity and average pain duration on the day of the operation and on the three succeeding days. The extent to which patients would be able to make such a retrospective 'average' rating for pain intensity and duration is unclear. Patients were also interviewed after discharge, at home, about subjective impressions of their care. Sofaer found patients in the test group had lower pain intensity and pain duration scores on the day of the operation and on the first postoperative day. At home, these patients also reported less pain than they had expected and felt the nurses cared about pain relief.

These findings suggest an increased knowledge and the stimulation of awareness of pain and its relief, together with provision of pain assessment tools may improve pain control after surgery. However, when Sofaer contacted the wards after the study had finished, she found her innovations had not been sustained without the reinforcement she had provided.

From this review of the literature, it seems nurses can have a (non-deliberate) effect on patients pain, by not assessing pain, or having assessed it and intervened, by not evaluating the intervention. Patient characterisitics, especially their illness, can affect ratings of pain, and this can only detract from individual assessment of patients pain relief needs. However, nurses seem to have the potential to reduce patients pain, using a variety of techniques, but research in this area is at present based on small samples, and studies are not always well designed. Thus additional well-designed studies, using larger samples would be necessary to develop and extend this knowledge.

2.4 Types of Pain Relief

The most common strategy for pain relief in hospital is administration of analgesic medications, that is drugs that reduce pain without loss of consciousness. It is one of the most effective, predictable, practical and fast methods of pain relief for a variety of conditions, McCaffery(1979). However, as Sweeney(1977) states, analgesia should complement and supplement the nursing care given, not replace it. Although analgesics are extremely useful, they constitute only one method of pain relief. Pain relief needs to be individualised so patients derive maximum relief via one or a combination of appropriate pain relief measures that work for them. Some methods of pain relief will now be reviewed.

2.4.1 Analgesics

Analgesics are classified into two groups: narcotic and non-narcotic drugs. Pain from somatic structures such as skin, muscles, bones and joints, responds to non-narcotic analgesics which do not alter psychic function or induce serious dependence. Pain from the viscera is more readily reduced by narcotic analgesics, Atweh & Kuhar(1983). A mixture of both types of drugs may give better relief than high doses of one alone according to Laurence & Bennett(1980) and McCaffery(1980a). Nurses are overconcerned about addiction of patients to narcotic analgesics, Cohen(1980), but McCaffery(1979) points out that to withold a narcotic until a patient has severe pain can cause craving and a preoccupation with pain. The prevention of severe pain is easier than its relief. Doctors underprescribe in terms of dose and time interval, and nurses administer narcotics less frequently than the prescription allows, McCaffery & Hart(1976). Part of the cause is a fear of respiratory depression, addiction and failure to apply basic pharmacological knowledge. This knowledge should include range of duration and evaluation of patients response to analgesia. The severity and duration of a patients pain and the rate at which he metabolises a narcotic cannot, according to

McCaffery(1979), be dictated by a doctors written order. The large variety of drugs available require the nurse to be familiar with various dosages and durtions of action, but Diblasi & Washburn(1979) believe nurses must pay closer attention to the drugs duration of action to achieve comprehensive pain relief.

A review of all narcotic and non-narcotic drugs and other pharmacological and surgical methods of pain relief will not be undertaken. This area has recently been reviewed by Bond(1984) and by Hosking & Welchew(1985).

2.4.2 Placebos

'Placebo' is derived from the latin 'I shall please' and is any treatment or care that produces an effect because of its implicit or explicit or nursing care therapeutic intent, and not because of its specific nature, that is, physical or chemical properties. McCaffery(1979) defines placebo responses as a) a true placebo response, b) a response due to other relief measures such as distraction or repositioning and c) as relief due to the cumulative effects of previous analgesia. The environment must be conducive to a positive placebo response. It is most effective in reducing clinical pain rather than experimental pain, Beecher(1960), because there is rarely a distress component in the latter. Some distress causes anxiety, and placebos may act partially via anxiety reduction. Suggestion, implicit or explicit, of the purpose of the placebo is a powerful aspect of the placebo environment and can even increase or decrease the effectiveness of proven treatments such as morphine, McCaffery(1979). Not all patients will receive relief from a placebo when it is used as an analgesic: pain relief occurs in about one third of patients. Evans(1974) reviewed twenty eight studies involving over two thousand patients and concluded that placebos reduced severe pain in 35-36% of patients. Grossi & Monza(1985) studied 68 patients with uteral colic who were told intramuscular saline was a potent analgesic. Complete

relief of pain was obtained in 29.4% of these patients. The placebo is usually half as effective as the active analgesia, whatever the analgesics potency, and will mimic onset, peak action and duration of action of the active analgesic, Evans(1974). It is suggested by McCaffery(1979) that there are few consistent placebo reactors or non-reactors, most are occasional reactors, and the effectiveness of placebos tends to reduce with repeated doses.

Lack of agreement over how placebos work exists, but anxiety reduction, classical conditioning (where stimuli previous associated with pain relief such as tablets or injections tends to produce pain relief in the future) and biochemical changes such as endorphin production have all been postulated. Weis et al(1983) found 31% of the 70 nurses in their sample felt the pain of patients who reacted to a placebo was not real. McCaffery(1979) stresses the placebo reactor is not 'faking' pain; he wants to be relieved of his pain and trusts something/someone, perhaps the nurse, to help him obtain pain relief.

2.4.3 Non-Invasive Methods Of Pain Relief

Melzack & Casey(1968) contend that the historical emphasis on the sensory component of pain has made these forms of therapy suspect, seemingly fraudulent. Meinhart & McCaffery(1983) claim nurses are not generally knowledgable about these methods. Some of these alternative methods of pain relief will now be reviewed.

a) Cutaneous Stimulation

McCaffery(1979) defines this as any stimulation to the skin to relieve pain. The rationale behind pain relief following cutaneous stimulation can be explained by the Gate Theory. Stimulation of the skin activates the large diameter $A\beta$ fibres and these act to modify the transmission of noxious stimulation by closing the gate, Melzack & Wall(1965). There are several

types of cutaneous stimulation, 1) firm pressure on an area, including acupuncture without the needles known as acupressure. 2) massage or vibration 3) Hot/Cold stimulation. Hot stimulation includes short wave diathermy, ultrasound, wet or dry heat, and cold stimulation includes the application of ice, cold water, towels soaked in cold water and cooled gel packs. 4) External treatment stimulation such as menthol, which stimulates the skin and has a mild anaesthetic effect. 5) Transcutaneous electrical nerve stimulation or TENS. This produces a buzzing/tingling/vibrating sensation transmitted via electrodes from a battery operated device. Bini, Crucou, Hagbarth, Schady & Torebjork(1984) found vibration sometimes completely inhibited moderate pain, although it only moderately reduced intense pain in their 16 subjects. Ali & Serrette(1981) investigated 40 patients undergoing cholecystectomy. They divided patients into three groups: 15 had a working TENS unit, 15 had no unit and 10 had a sham unit. They found patients with the working TENS unit had significantly fewer analgesics and better lung function tests than those with sham or no units. A similar approach was used by Cooperman, Hall, Mikalacki, Hardy & Sadar(1977) when they investigated the use of TENS in the control of postoperative pain in 50 patients. They gave 26 patients a working TENS unit and 24 a non-working unit. They found 77% of the group with the working unit had good to excellent pain control, significantly more than the 33% of those with the sham unit who had this level of relief. Further support for the effect of TENS was provided by Rooney, Subhash & Goldiner(1983) who looked at 44 post-thoracotomy patients. Half the patients had a working TENS unit and half a sham unit. They found all those with sham units needed narcotics in the first 24 hours postoperatively, whereas 22.7% of those with a working unit had no narcotics during the same period.

Not all studies have supported the effectiveness of TENS. For example, Cushieri, Morran & McArdle(1985) studied 106 patients after elective abdominal surgery and found there was no significant difference in

pain, morphine requirements or the incidence of chest infections between those patients who had TENS and those with a sham unit. Similarly, Taylor, West, Simon, Skelton & Rowlingson(1983) found 30 patients with a working TENS unit and 20 with a sham unit had significantly fewer analgesics than 25 patients receiving usual narcotic therapy. Both these studies suggest a possible placebo effect was operating, although this is not supported by the other research reviewed so far. Conflicting results seem to exist. These may partly be explained by Lundenberg(1979) who points out not all frequencies of TENS are effective for all patients.

If TENS does reduce pain, as it seems to, how does it work? Campbell & LaHuerta(1983) argue that analgesia induced by TENS is not due to the activity of an opiate induced pain modulating system. They found pain relief induced by TENS was not affected by naloxone, an opiate antagonist. Applying the Gate Theory, Melzack & Wall(1965), it would seem stimulation of the large $A\beta$ fibres associated with touch modulates noxious input in the dorsal horn of the spinal cord.

b) Relaxation

Physical and emotional rest are a general aspect of pain relief according to Bond(1984), and relaxation can achieve a sense of rest. McCaffery(1979) defines relaxation as freedom from both anxiety and skeletal muscle tension. She divides relaxation into 1) meditation, 2) concentrating on a single thought or task, for example, some forms of yoga which encompasses relaxation and mental repetition of a word or phrase, 3) progressive relaxation, in which muscles are tensed and relaxed, 4) autogenic training encompassing conscious, silent repetition of phrases like 'my arm is heavy and warm', and 5) biofeedback, where visual and/or auditory information on the status of a function is used to control this function, for example, using an electromyograph (EMG) to control relaxation. Madden, Singer, Peck & Nayman(1978) investigated the effect of EMG feedback on

postoperative pain after abdominal surgery. They found EMG feedback from the abdominal muscles may be effective in reducing pain, compared to EMG from the frontalis muscles or no EMG. However, in this study there were only four in each of the three groups, so the findings should be viewed cautiously. The extent to which relaxation is incorporated in EMG feedback is unclear, Blanchard, Andrasik & Silver(1980) concluded there was no consistent advantage of EMG feedback over relaxation. Wells(1982) found relaxation decreased psychological distress but not the physical intensity of pain. Again, the results must be interpreted with care as there were only six subjects in each of the two groups in this study. The approach to teaching relaxation may be important as Clum, Luscomb & Scott(1982) discovered when relaxation training was effective, whereas relaxation instructions were ineffective, in decreasing verbally reported pain. Relaxation was found to increase pain tolerance compared to a control group by Bobey & Davidson(1970). Flaherty & Fitzpatrick(1978) concluded that teaching relaxation decreased muscle tension and improved comfort. Relaxation can take many forms; music was found by Locsin(1981) to reduce analgesics needed over fourty-eight hours after surgery. Not all studies support the role of relaxation in decreasing pain: Pickett & Clum(1982) found relaxation training and relaxation instructions did not decrease pain and anxiety postoperatively, compared to a control group. Most of the studies reviewed have found that relaxation seems to reduce pain. McCaffery(1980b) agues that this is because it can reduce anxiety associated with pain, it can reduce muscle tension pain, decrease fatigue via reducing the fight/flight reaction whilst promoting rest, and it can increase the effectiveness of other pain relief measures.

c) Distraction

This is the focusing of attention on a stimuli other than the pain sensation, and is what McCaffery(1979) calls 'sensory shielding'. McCaul & Malott(1984) describe distraction as, "directing one's attention away from the

sensation or emotional reactions produced by the noxious stimuli." The stimuli is an object or physical stimuli that exists (compared to imagery, discussed next). Copp(1974) found patients used distractions such as counting bricks and patterns. McCaffery(1979) describes distraction as the placing of pain on the periphery of awareness, but points out full awareness of pain returns quickly after the distraction has stopped. Fatigue often follows distraction as does an increased awareness of pain and irritability, so pain relief should be available afterwards, or the disadvantages may outweigh the benefits. Clinically, the patient who happily talks to his relatives and friends one minute, and asks for painkillers the next should not be disbelieved as those interactions may have served as a temporary distraction from the pain. Blitz & Dinnerstein(1971) found attentional mechanisms increased the pain threshold to freezing water compared to a control group, in a study involving 36 subjects. Ahles, Blanchard & Leventhal(1983) studied 84 males who underwent cold pressor tests. Of their three groups of attention (verbalise sensations), distraction (name high school courses and teachers) and emotive (experiences associated with the tests) the attention group reported the least and the emotive group the most distress. This suggests the nature of distraction may be important. Distraction may also affect anxiety as Bloom(1977) found. Attentional diversion was more effective than situation redefinition in reducing the stress of electric shocks for 192 female students. The attentional diversion involved reading a story and evaluating it, which required more involvement and thus distraction than just reading it. Pickett & Clum(1982) studied 59 patients who had a cholecystectomy. They found that although relaxation training and relaxation instruction did not decrease pain and anxiety postoperatively, attention-redirection did reduce postoperative anxiety state. Cognitive distraction was thus effective in reducing postoperative anxiety. It was concluded by McCaul & Malott(1984) that the more attention involved, the more effective the distraction, which supports Bloom's(1977) findings.

d) Imagery

This non-invasive technique of pain relief involves developing images rather than using actual objects as in distraction. It involves using any/all of the senses and the imagination is used to develop these images, which reduce the intensity of the pain or become a pleasant or non-painful substitute for pain. McCaffery(1979) argues that if the patient relives the entire sensory experience, pain diminishes or disappears totally. This is based on the belief that images can affect the functioning of the body in ways over which one ordinarily has little or no control. For example, imagining a lemon in the mouth can produce saliva, a frightening film can increase pulse, respirations and blood pressure. The relevance of the content of imagery for the subject may be important: Worthington(1978) found if subjects chose the content of their imagery they could tolerate a cold pressor test for longer and reported less pain.

Imagery and distraction are also known as 'cognitive coping skills'. Scott & Barber(1977) found cognitive strategies increased pain tolerance by 100% compared to a control group, although these strategies did not change the ratings of pain intensity or distress. They concluded it was easier to change pain tolerance than perception of pain and the distress produced by pain. This is supported by the work of Chaves & Barber (1974) who also found cognitive strategies reduced pain compared to a control group. The effectiveness of distraction and imagery both suggest higher cognitive processes exist which are capable of modulating pain.

e) Operant Conditioning

This will be mentioned for the sake of completeness. It involves negative and positive reinforcement of pain related behaviours, but McCaffery(1979) argues this technique has "no place in the care of patients with acute and perhaps severe postoperative pain".

All of these non-invasive techniques of pain relief overlap to varying degrees. Kaplan, Metzger & Jablecki(1983) found relaxation, cognitive strategies and both were more effective than a control in increasing tolerance for a painful EMG examination, but neither was better than the other. A collection of strategies was used by Morgan(1980) who investigated 100 patients after abdominal surgery. An experimental group who were given information on guided imagery, relaxation and the distraction of rhythmic breathing had significantly lower distress scores, although not pain ratings, than the control group. This however was not supported by the work of Geden, Beck, Hauge & Pohlman(1984), who found that sensory transformation was effective in reducing laboratory simulated labour pains in 100 nulliparous women. However, relaxation training, pleasant imagery, neutral imagery and combinations of strategies did not reduce pain. When Graffam(1984) looked at this area, she found indiviually adapted combinations of several strategies were often used by the nurse. These results emphasise the need for the patient to select, or be helped to select, those methods with which they feel most comfortable, and may already use. It is important to remember not all methods will be equally effective for everyone, and substantial practice may be necessary before any maximum effect is attained.

2.5 MEASURING PAIN

2.5.1 Introduction

The subjective nature of pain makes it difficult to measure and the problems of defining pain extend to its measurement. Revill, Robinson, Rosen & Hogg(1976) argue it is difficult to measure pain as it is usually accompanied by other sensations, and the reaction component affects the judgement of pain, regardless of intensity. Crawford-Clark(1984) describes reports of pain as "noisy" sources of information since they represent a complex sensory and emotional experience. It can also be difficult for a patient in pain to concentrate on that pain and rate it, Walsh(1984).

However, if nurses are to play a key role in pain relief, they need to assess their patients' pain. Pain cannot be directly measured, only indirectly assessed. Some ways in which this can be done will be outlined, followed by a discussion of various pain measurement tools.

Commonly used concepts are pain threshold (when pain is first perceived), and pain tolerance (the amount of pain the patient will endure). They are, however usually laboratory concepts, and they and the more recent 'sensory decision theory' measurement of pain (where stimuli of various intensities are randomly delivered and the subject responds to these stimuli as painful or not painful) have been reviewed by Crawford-Clark(1984) and will not be further explored.

There are three main areas that can be used as a basis for the clinical measurement of pain. First, by measuring physiological signs, such as blood pressure, pulse, and respiration, second, by observing behaviour, and third, by using the patient's subjective report.

2.5.2 Physiological Signs

There are three main types of physically related measures used to

assess pain; autonomic signs, respiratory function, and number of analgesics administered. Autonomic signs such as blood pressure, pulse and respiration may be used. This approach has the advantage of seeming objective and comparatively easy to use. However, Stewart(1977) describes it as unsatisfactory because such indicators reflect other emotions and stresses, such as anger or fear, and other physiological conditions. It is thus difficult to detect a pattern of responses unique or specific to pain. Bourbonnais(1981) and Storlie(1978) point out that parasympathetic stimulation resulting from pain in the bladder, rectum and colon decreases pulse, respiration and blood pressure, rather than increasing them as in sympathetic stimulation. This further complicates interpretation of these measurements. Vogt, Meyer-Schwertz, Metz & Foeher(1973) suggest, "heart rate should only be used as an index of a particular physiological or psychological stress factor, only if the simultaneous influence of other factors is taken into account." p45. This would be very difficult to achieve in the clinical setting and Hayward(1975) describes physiological measurement as more useful for assessing experimental, rather than clinical pain. This contention supports that of Sternbach(1968), who argues the validity of responses elicited by different pain stimuli, and the additional variance contributed by individual differences in response patterns, makes it difficult to specify a pattern of physiological responses characteristic of pain. Adaptation occurs after initial arousal and physiological signs do not appear, Hawley(1984). Wolff(1978) outlines how repeated noxious stimulation leads to an autonomic nervous system response of arousal rather than pain, thus response patterns are non-specific. Thus the interpretation of autonomic signs is more complicated than it initially appears.

Another physiological measure that has been used to assess pain is respiratory function. The most usual measure being vital capacity, or the amount of air that can be expelled from the lungs after full inspiration, Ganong(1981). An example of this approach is the work of Knight &

Mehta(1978) who measured postoperative pain relief by changes in lung function. Parkhouse & Holmes(1963) argue vital capacity is evidence of performance, but not all pain interferes with respiratory activity. Huskisson (1974) points out vital capacity is also partly a measure of the amount of energy a patient is willing to expend. This influence of energy on measures of vital capacity is considered by Felton, Huss, Payne & Srsic(1981) who propose fatigue could play a part in these measurements. However, Dalrymple et al(1972) found a highly significant correlation between pain scores and vital capacity impairment at 24 hours after surgery. They also found neuroticism strongly correlated with vital capacity at this time: the higher the neuroticism score, the lower the vital capacity. It would seem that vital capacity is not a particularly valid measure of postoperative pain: interpreting a decrease in vital capacity as specifically due to pain is problematic. The results of these studies suggest this measure may well be tapping several different variables, such as site of incision, the co-operation of the patient and fatigue, not just pain. Craig(1981) after reviewing the literature on pulmonary function concludes pain was "one of several active factors" in reducing vital capacity.

Although Pickett & Clum(1982) used analgesic consumption as a behavioural estimate of pain, it has often been used as an 'objective' measure of pain. However, the number of analgesic doses do not necessarily reflect pain levels. Ward policy, nursing routine, attitudes of staff and the patient towards analgesics are all variables affecting the number of analgesics taken. Drew et al(1968) point out that the number of analgesics taken can reflect not only pain levels, but anxiety as well. They are, at best, a rough indicator of pain and it would seem advisable not to use this method in isolation without other measurements of pain.

2.5.3 Observing Behaviour

This is a second approach to estimating pain, and is something nurses

should do in the course of their work.

Sternbach(1968) points out behaviour is not a direct measure of pain, behaviour observed is not a direct transmission of sensation because one may be assessing coping mechanisms. Observing behaviour is not very sensitive to milder pain. Stewart(1977) contends that the absence of pain expression does not rule out the presence of pain. Patient behaviour and observation of this behaviour is a complex interpersonal process. Non-verbal behaviour is affected by, amongst other things, anxiety, depression, response style, and ethnic background. The observer's personality, professional and personal experience with pain influences the amount of pain inferred. Lenburg et al (1970) found doctors and nurses inferred less distress than nuns or teachers. Teske, Daut & Cleeland (1983) investigated the relationship between nurses' observations and patients' self reports of pain and concluded that the discrepancy between patient self report and observer ratings may be quite large. As Huskisson (1974) asserts, could one believe an observer who says the patients pain reported by the patient as 'severe' is infact 'moderate' and the patient is exaggerating? A more global rating of general physical condition and emotional state made by nurses and patients was found by Eisler, Wolfer & Diers (1972) to have a reliable and moderate degree of consistency between nurse evaluation and patient self report. This assessment did not specifically include ratings of pain, although they may have played a part in these global assessments. Their study involved 64 patients and two nurse investigators. The nurse could use whatever information was available to complete a six-point scale from very poor to excellent. However, these nurses were research nurses not nurses working on the wards, so even if the ratings did reflect pain scores, the extent to which this correlation would apply with ward nurses is unclear.

It is therefore difficult to use observation of behaviour to assess postoperative pain because it may not always detect pain. Deciding what does and does not represent a pain behaviour is a value judgement on the part of

the observer.

It seems physiological signs and behavioural cues can be unreliable and invalid for assessment of acute postoperative pain. The patient may not know their pain is being assessed and they may be assigned a pain value with which they do not agree. Murrin & Rosen(1981) describe the validity of objective measurements as "more tenuous that that of the subjective approach."

2.5.4 Patients Own Ratings

A subjective, self report is a third method of assessing a patient's pain. It involves asking the patient; involving the patient in their care, and giving them a chance to say how they feel. Although Liebeskind & Paul(1977) describe verbal report as a behaviour, it will be considered as a separate category for the purposes of this study.

Central to the use of subjective pain measurement is McCaffery's definition of pain,

> "Pain is whatever the experiencing person says it is and exists whenever he says it does." McCaffery(1972) p8.

It involves believing the patient. If the patient is the authority about their pain, it seems logical to ask them about it, rather than observing or 'measuring' pain then deciding what does and does not represent pain. Not all studies accept this definition. Peck(1967) refers to patient ratings as, "merely estimates made by the patient himself." p193. Weisenberg (1977), criticising Beecher(1959) said, "..the most serious flaw in Beecher's approach is lack of knowledge of the pain stimulus." p1014. However, if the patient is believed, it is their report of pain that is important, not the intensity of the stimulus that may precipitate it. Many authors; Houde, Wallenstein & Roger(1960), Lasagna(1960), Scott & Huskisson(1976) and Beyerman(1982), amongst others, all have argued a patients pain is best defined by the person who feels it. Self report measures can detect less severe pain and they represent a simple index for measuring pain.

The disadvantages of self report include over or under reporting pain, for many reasons, including the social desirability of the response; what does the patient think they ought to say, Wolfer(1973). Fordyce, Lansky, Calsyn, Shelton, Stolov & Rock(1984) found patients with chronic pain showed significant differences between the effects they said pain had on their activities and its observed effects. However, this is less likely to apply to patients in acute pain, Fordyce (personal communication 1984). As Revill et al(1976) point out, any measure of pain is a composite effect of the pain stimulus and the subject's readiness to report that pain. How much is the patient willing to report? They may want to appear brave, and the nursing staff may actually reinforce this, McCaffery(1979). Reading(1984) adds that asking the patient about their pain may sensitise them to their pain, thus affecting their rating. Self report is described by Craig(1983) as highly obtrusive. He also adds that asking the patient about pain may sensitise them to it, thus the report is distorted, either purposely or unwittingly. If the scales are too long, complicated or difficult this could also affect the patient's rating of their pain.

2.5.5 Types of Pain Rating Scale

There are many different ways of asking the patient about their pain. Unstructured verbal reports from the patient, looking at onset, duration, location and intensity of pain and its effect on activities of daily living are very important, but are not always useful for monitoring hour by hour and day by day changes. Patients are not all equally articulate and unstructured verbal reports give no real record that can be passed on to other people.

Several different scales available for measuring pain will now be discussed.

a) Visual Analogue Scale (VAS)

The VAS consists of a blank line, with the two extremes of the rating at either end, as figure 3 illustrates.

The left hand side is equal to no pain at all and the right hand side is equal to as much pain as you could bear. The line joining these points is equal to all the pain between these extremes or anchor words. The patient is asked to put a cross on the line in the place they feel is most like their pain now. The distance to this mark is measured in millimetres(mm) or centimetres(cm) from the left hand side of the line.

The best line size was found to be 10, 15 or 20 cm by Revill et al (1976) as these lines showed least variance when 20 subjects made repeated ratings of the same remembered pain. Clarke & Spear(1967) found a 10 cm line to be sensitive and reliable. Revill et al(1976) also found 150mg of intramuscular Pethidine made no significant difference to the estimation of distance on this line. However, these subjects were aged 20-35 years, and whether this would apply to older patients receiving Pethidine is not discussed. Photocopies could reduce or lengthen horizontal lines by plus or minus 5mm according to Bloomfield & Hanks(1981). They recommended these scales should be printed.

The advantages of this scale include there being no numbers or word descriptors related to the pain experience, except for the anchor words. The patient is thus not forced to select a word which may not exactly represent their pain. Huskisson(1983) preferred this scale because of its "additional sensitivity", and Revill et al(1976) found the scale sensitive to distinct differences in the pain experience. However in this phase of their study they only tested 20-30 year olds, the results of using this scale with an older population are unclear. The data from the VAS is usually treated as interval in nature.

Disadvantages include this scale being too abstract for some patients. A thorough explanation can help, but some people may not be able to

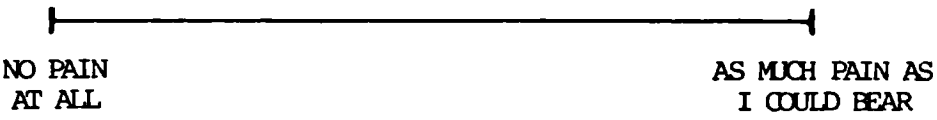

FIGURE 3. Visual Analogue Scale To Assess Pain.

This scale consists of a 100mm line, with one set of anchor words at each end; no pain at all and as much pain as I could bear. The patient is asked to place a cross on the line in the place which is most like their pain now. The distance to this cross is measured in millimetres from the left hand side and this measurement represents their pain score.

conceptualise their pain in reference to a line with no guide posts as Hayward(1975) and Scott & Huskisson(1976) found. Sriwatanakul, Kelvie & Lasagna(1982) studied 120 subjects and found nearly 4% were unable to understand the VAS. Walsh(1984) investigated 98 patients and found 26 were unable to complete it, and a few misunderstood it completely. Some saw it as representing the left to right of the body, or head to toe, or marked pain severity by height above the line, even when the scale had been explained in detail. In a study of 56 patients, Kremer, Atkinson & Ignelzi(1981) found 11% of patients were unable to complete the scale, especially if they were elderly. They argue that where abstract ability is likely to be low and patient compliance is tenuous, a verbal rating scale should be used. Thomas & Griffiths(1982) found postoperative patients had difficulty in marking the scale accurately, and Nayman(1979) reported that patients found it difficult to concentrate and mark the analogue scale in the immediately postoperative period. Guidance in completing the VAS was found necessary by Hunt, Stollar, Littlejohns, Twycross & Vere(1977).

However, Huskisson(1983) states, "failures are very rare with careful explanation." p36. No problems using the VAS were reported by Taezner(1983); if he encountered any difficulties, scale was compared to measuring the temperature with a thermometer and the freezing and boiling points of water. Sriwatanakul, Kelvie, Lasagana, Calimlim, Weis & Mehta(1983a) also emphasise that there are seldom any problems if the scale is properly explained, if patients had any difficulty they were told to choose a number from 1 to 100. No comment is made as to whether these alternative explanations altered the nature of the scale. Murrin & Rosen(1981) assert the VAS is as easy to use as a verbal rating scale if it is carefully explained. However, if patients are asked to use a scale which they do not fully understand, and cannot conceptualise their pain in reference to a line with no guide posts, this could lead to random marking of the scale to please the investigator. It may make the patient feel uncomfortable and lead to loss of rapport.

b) Graphic Rating Scale (GRS)

The GRS, is like the VAS but has words along the bottom to give the patient more of a guide, as figure 4 illustrates.

Scott & Huskisson(1976) found it was best if words were spaced equally along the bottom, as this reduced the tendency of subjects to cluster their ratings over the words. If this clustering does occur, the scale could then be seen as comparable with a verbal rating scale. If, like the VAS, data is treated as interval in nature and the words slight, moderate, severe are used, moderate is obviously a longer word and takes up proportionally more of the line. Interpreting data as interval then becomes less justifiable. The pain score is derived, like the VAS by measuring in mm or cm from the left hand side of the scale. Also in this category is the numerical rating scale,(NRS). This is like the GRS but with numbers along the bottom. The disadvantages with this include clustering of responses over favourite numbers, Syrjala & Chapman(1984). However, Downie, Leatham, Rhind, Wright, Branco & Anderson(1978) studied 100 patients with rheumatic disease who were asked to rate their pain on verbal rating scale, a VAS and a NRS. They found the NRS provided a good compromise between the verbal rating scale which offered few choices and the VAS where the great freedom of choice can be confusing. However, even with these added guidelines some patients may not be able to conceptualise their pain along these dimensions.

c) Verbal Rating Scale(VRS)

This scale, sometimes known as simple descriptive scale, usually has three to seven discrete categories, one of which the patient has to mark. Figure 5 illustrates a verbal rating scale with five categories.

For example, no pain, a little pain, quite a lot of pain, a very bad pain, and as much pain as I could bear, scoring 0,1,2,3 & 4 respectively. The data obtained from this scale is ordinal or ranked in nature: it cannot

FIGURE 4. Graphic Rating Scale To Assess Pain.

This scale consists of a 100mm line, with one set of anchor words at each end; no pain at all and as much pain as I could bear. The line joining these points has the words 'slight moderate severe' equally spaced along the line to serve as added guidlines for the patient. The patient is asked to place a cross on the line in the place which is most like their pain now. The distance to this cross is measured in millimetres from the left hand side and this measurement represents their pain score.

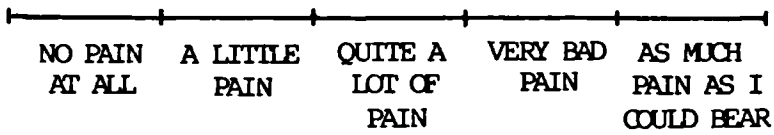

FIGURE 5. Verbal Rating Scale To Assess Pain.

This scale constists of a 100mm line, with five sets of words, each in one of five discrete boxes. The patient is asked to place a cross in whichever box is most like their pain now. From the left handside, this cross gives a pain score 0, 1, 2, 3 or 4 respectively.

be assumed that there are equal intervals between categories. For example, the difference between a little pain and quite a lot of pain is not necessarily the same as the difference between a very bad pain and as much pain as I could bear. Revill et al(1976) argue patients may find it difficult to choose between categories, and may be forced to select a category that does not reflect their true sensation. Advantages of this scale include that patients find it easy to understand and complete, and it is easy to administer and score. Kremer et al(1981) found all 54 patients in their study were able to complete it and most preferred it. Disadvantages include semantic problems; words have different meaning for different people. Concepts can vary from person to person as well as from time to time in the same patient. Freyd(1923) said only "universally understood" phrases should be used. This is more problematic than it seems. Fordyce(1978) feels pain language is confounded by too many unidentified variables to be of use in pain measurement. He does however, refer to a population of patients in chronic pain.

d) Comparisons Between The Verbal Rating and Visual Analogue Scales

Having looked at the scales separately, how do the VAS and VRS compare? First, how sensitive are they? Littman, Walker & Schneider(1985) carried out a retrospectve study of 1,330 patients drawn from 23 similar drug trials. They concluded there was, "...no consistent difference in sensitivity between the verbal and analog scales." p22. They felt the choice of scale was probably not critical since they correlated strongly and sensitivity differences were rarely large. However, many authors do not agree with their conclusions. For example, Joyce, Zutshi, Hrubes & Mason(1975), in a study of 74 patients suffering from chronic pain, concluded that the VAS was more reliable and sensitive than the VRS. They used a 10cm line and divided it into 100mm, thus its increased 'sensitivity' is not suprising, especially when compared to only a four point VRS. The four

points were decribed by 'No pain at all, some pain, considerable pain and pain which could not be more severe.' Taking an extreme argument, this scale only has three choices of pain intensity, and the latter categories are extreme and perhaps not most suited to patients in chronic pain. The remaining adjective 'Some' has been found difficult to quantify by Sriwatanakul et al(1982). One could then argue that a 100 point scale is being compared to a scale with only one point, hence greater sensitivity of the former is inevitable. Joyce et al did find the majority of responses were in the middle two categories. In Joyce's study, of those patients who expressed a preference, 32 preferred the VAS as it was more accurate and sensitive, and 20 preferred the VRS as it was easier and more definite. Langley & Sheppeard(1984) found the VAS was more sensitive to changes in pain than the VRS when used with 37 patients suffering from arthritis, who had stopped analgesic medication for 48 hours. They used a seven point VRS, none, mild, slight, moderate, severe, extreme and worst pain ever. Ohanus & Adler(1975) argue that using a VRS rather than a VAS means a, "continous sensation is artifically transferred into a digital system." p380. It does seem, that despite problems in deciding how far you can divide up a line and expect patients to differentiate to such a fine degree (100 different points, for example) the VAS is more sensitive to changes in pain. The VRS is described as "certainly inferior" to the VAS by Murrin & Rosen(1981). Syrjala & Chapman(1984) add that there is little controversy over the statistical superiority of the VAS. These disadvantages may be less than a random mark on a scale which is not fully understood. One has to decide whether the very fine sensitivity of a scale is more important in the clinical setting than another, perhaps less sensitive, but easily understood scale.

Correlations between the VAS and VRS have been reported. Langley & Sheppeard(1984) found a significant correlation, $r=0.82$ $p<0.001$, as did Woodforde & Merskey(1972) $r=0.87$ $p<0.01$. Two phases of a study by Downie et al(1978) found correlations between these scales of $r=0.72$ and $r=0.78$.

Significance levels were not reported in this study or in one by Rigamonti, Zanella, Lampuguani, Marrano, Campione, Bruni, Mandelli & Sacchetti(1983) who reported a correlation of r=0.96 between the two scales. However, the latter study excluded "unreliable subjects" which they did not further define, and which may partly account for such a high correlation if patients who had difficulty completing the VAS were excluded. Chanus & Adler(1975) reported a correlation of r=0.81, but there were only six patients in this study.

The VAS and VRS appear to be consistently correlated, but do these scales measure the same phenomena?

Sternbach(1978) described the VRS as having an affective loading, and for a more 'pure' sensory measure of clinical pain intensity the VAS should be used. Syrjala & Chapman(1984) reiterate this, "...the affective component may be weighted more heavily in adjectival scales than the sensory component." p77. However, because the correlations between the scales are large, it would seem to indicate the influnce of any affective loading is small.

e) Other Issues Arising From Subjective Pain Assessment

Should the scale be vertical or horizontal? Sriwatanakul et al(1983a) found patients preferred a horizontal scale to a vertical or curved scale. Dixon & Bird(1981) point out that a vertical VAS has the potential of added error, depending on the angle from which it is viewed. Scott & Huskisson(1979b) gave one vertical and one horizontal VAS to 100 rheumatology patients. They found there was a high correlation between patients' ratings of their pain on both scales, r=0.99 $p<0.001$, however, mean scores were different, so it would seem best to keep to one scale.

Does it matter if patients see previous scales? Opinions are divided on this issue. Carlsson(1984) states scales should be completed without reference to previous scales, whilst Scott & Huskisson(1979a) found 92

patients with painful rheumatic disorders tended to overestimate pain severity if previous scores were not available. However, this latter study addressed long term use, from two weeks to three years later, and the error increased with time. How far this error would exist with patients over a shorter time span is unclear. Reading(1984) felt if patients made repeated ratings, they may use the scale to reflect different components of the pain experience. If the patient feels they have pain, whichever component is predominant, perhaps this argument becomes immaterial.

Can patients reproduce a mark on a line? Dixon & Bird(1981) studied eight patients who were asked to reproduce a previously marked VAS. There were ten different marks and each had to reproduced seven times. They found the most consistent estimates were at apicies and the midpoint, although estimates for the mid-point invariably fell short. The most difficult point to reproduce was plus or minus 2cm of the mid-point. They concluded patients using the VAS tended to estimate towards the extremities or the centre, and thus viewed pain as mild or severe, or somewhere vaguely in between. However, with such a small sample these findings must be interpreted cautiously.

f) Sensory Matching or Cross Modal Assessment of Pain

Using this method of pain assessment, pain is compared to another sensation, for example, audio signals or various coloured circles. Data from this type of assessment is usually considered interval in nature. Peck(1967) in an anecdotal report of use, asked patients to "find a tone that is the same in loudness as your pain is strong." p190. Gerson(1980) partly utilised this method when asking outpatients to rate their pain on a VAS. As they moved the marker along the scale from no pain to worst pain imaginable, a low to a high pitch shriek was emitted. If audio signals are used, and pain is very severe, a very loud noise would be needed, placing unnecessary

stresses on the ill patient. Stewart(1977) used different colour combinations within circles to represent different pain intensities. Colour was also utilised by Nayman(1979) who used white to represent no pain, yellow for mild pain, orange for moderate pain, red for severe pain and purple for intolerable pain. Similarly, Grossi, Borghi, Cerchiari, Della Pupa & Francucci(1983) used a coloured stripe from pale pink to dark red with the anchor words of no pain and unbearable pain at the two ends of the stripe. They found 80% of their sample of 50 preferred this to the VAS and found it easier to understand. Handgrip strength was found by Gracely, McGrath & Dubner(1978) to be a useful form of cross modal pain assessment in the laboratory.

The proponents of these approaches argue that it is the actual matching of two sensations, rather than comparing a sensation with a symbolic representation: a point on a scale. However, it could be argued that it is just as abstract to compare pain to a colour or a noise as it is to compare it to a point on a scale. Indeed, Wolff(1978) argues that strictly speaking, the VAS, GRS and VRS are cross modal because pain is transferred to another visual modality, a point on a line. Woodforde & Merskey(1972) found a lower correlation between the VRS and cross modal intensity from pressure stimuli than between the VRS and the VAS. So it seems possible that sensory matching is not tapping the same dimension as the rating scales.

When these more complex methods are reviewed, the important question seems to be do they add anything to the simpler scales? If they do not, can their use be justified? Procacci & Maresca(1984) state, "more complicated systems do not, in our experience yield better practical results." p434.

Although Chapman(1983) concluded that he doubted whether these rating scales could yield pure measures of intensity, major criticisms of the scales reviewed so far is that they measure only intensity, neglecting the motivational/affective and evaluative aspects of the pain experience. Chapman(1976) maintains that investigators have been, "guilty of

conceptually simplifying pain in order to measure it, like Procrustes, who amputated the feet of his guests in order to fit them into his bed." p353. Campbell & LaHuerta(1983) argue that pain is a qualitative statement and mapping the subjective intensity of pain on a scale cannot make it a truly quantitative measure. This point is taken up by Syrjala & Chapman(1984) who question whether pain represents itself in private experience in a linear fashion and forcing judgements onto a length scale may be quite distorting. They describe this conceptual oversimplification as a major limitation in pain measurement. Melzack(1984) stated, "To consider only sensory function and to ignore its motivational and affective properties is to look at only part of the problem, and not even the most important part at that." p33. This criticism is theoretically supported by the gate theory, which recognises the multidimensional nature of pain.

In an attempt to overcome this criticism, scales taking into account other dimensions of the pain experience have been devised.

g) Johnson's Two Component Scale

This scale, devised by Johnson(1973) measures the physical feel of the pain and how much the sensation bothers the patient, as figure 6 illustrates.

It is divided into sensory/discriminative and reactive components of pain. But this scale is abstract and there is some ambiguity over the word 'maximum', making it difficult to perceive this word as the end point on a continuum. The distress scale is, in effect a GRS with groups of words, which Scott & Huskisson(1976) argued caused clustering of ratings over these words.

Taenzer(1983) found a correlation of $r = 0.88$ between pain and distress scales and concluded little information would be gained by using two rather than one scale in patients undergoing cholecystectomy. A lower but still significant correlation between these scales was found by Feldman(1986) in laboratory induced pain in a group of 109 healthy male volunteers, $r=0.48$ $p<0.01$. These correlations could be partly due to the

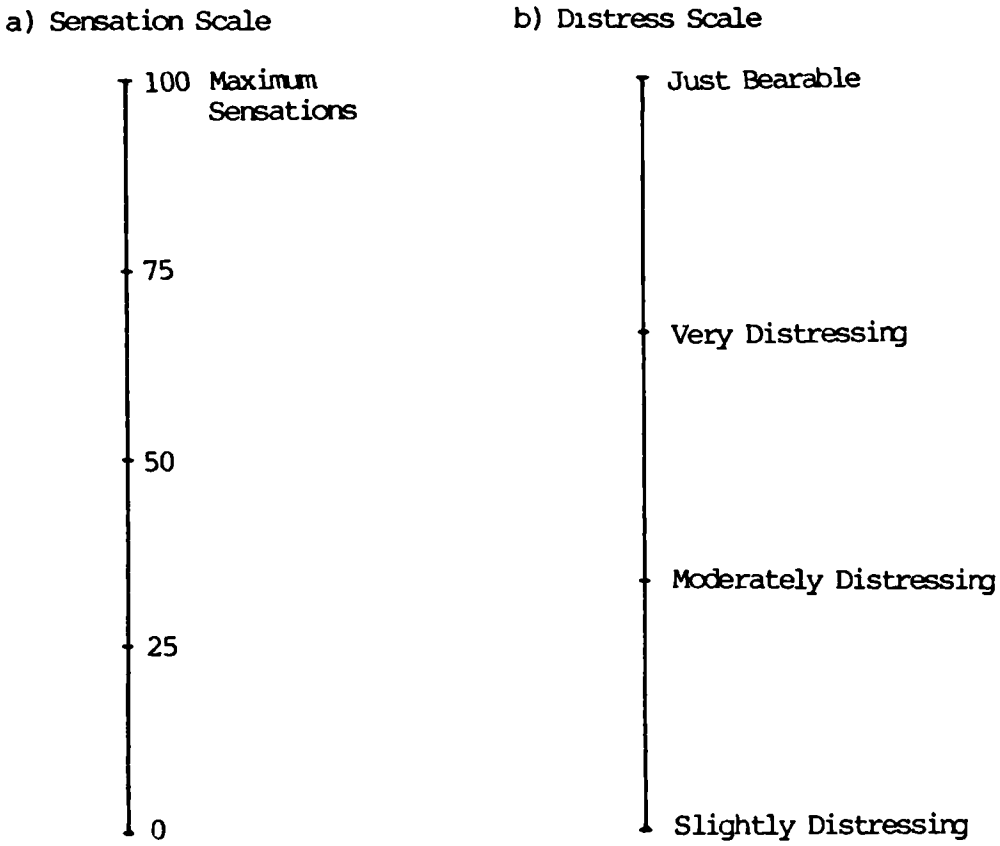

FIGURE 6 Johnson's Two Component Scale To Assess Pain.

Subjects are shown these scales and told sensation means the physical intensity of what they are feeling. The distress scale refers to the amount of distress the sensations cause. Subjects are asked to think of the degree of sensation they feel and how distressing that sensation is as two separate things.

FROM JOHNSON(1973) p263

'halo effect' described by Hamilton(1968) where the marking of one scale effects the marking of the next; the ratings tending to be made in a similar place. The correlations could also be partly due to patients in Taenzer's sample being in acute pain. Reading(1982) concluded patients in acute pain showed less differentiation between components of the language of pain. Patients in chronic pain might be expected to show more marked differences in ratings. Feldman's sample experienced pain in the laboratory, which is also likely to have less affective connotations than would be likely in clinical, especially chronic, pain.

h) McGill Pain Questionnaire (MPQ)

This questionnaire provides information on the intensity and quality of pain, including its affective and evaluative components. It was devised by Melzack & Torgerson(1971). It comprises twenty groups of upto five words and the patient chooses whichever word in each group (if any) best describes their pain. During the development of this scale, the MPQ items were ranked by doctors, patients and students. The intensity values between groups differed, but all three groups agreed on the relative ranks of the words. Melzack & Torgeson maintain that treating pain as purely sensory is too limited and denies the unique qualities of pain: the sensory dimension is only one of many dimensions. They argue the verbal descriptors representing specification of the properties of pain (involving multiple choice) are not as subject to "Psychological Impendencies" of the moment as are the word estimates of pain which involve a single choice. They argue the rank of a descriptor is a more stable and reliable indicator of pain intensity than a chosen value on the word/number scale. Their questionnaire also includes a rating of present pain intensity(PPI) using the words No pain, Mild, Discomforting, Distressing, Horrible, Excruciating. However, it seems possible to have a 'Mild' pain that is also 'Horrible' and Jacox & Stewart (1973) found some patients who rated their pain as 'mild' or 'discomforting' equated this with 'no pain' on

other scales, thus this scale may not measure 'present pain intensity'. Reading(1982) found a low correlation between the PPI and the VAS, again suggesting they may not be measuring the same variable. Although this was not supported by Walsh & Leber(1983) who found a higher correlation of 0.70 $p<0.001$ when they studied 45 patients with chronic pain.

Are acute surgical patients an appropriate patient group to whom the MPQ could be administered? It can take upto thirty minutes to administer, which for repeated postoperative use could tire patients. Walsh(1984) described it as, "too long...and therefore unsuitable as a frequently repeated measure." p97. He argued completion depended on verbal skills, which have strong ethnic, cultural and educational bias. Patients may choose words with which they are familiar, irrespective of whether or not they relate to their pain. This supports Wolff(1978) who claims the MPQ is only as good as the patient's verbal skills, and, "many of the words are too difficult for the 'average' patient...and the applicability of the questionnaires thus becomes rather restrictive." p148. Murrin & Rosen(1985) say it is unsuitable for rapidly changing pain, which often decribes postoperative pain. It would seem to be more appropriate for patients with chronic pain.

2.5.6 How Frequently Should Scales be Administered?

When assesseing pain, if only one or two time points are used, for example, once before then once after surgery, the complexity of pain is neglected, according to Keeser & Bullinger(1984). However, Taenzer(1983) concluded pain on the second and third afternoon was an adequate approximation for all pain experienced across post cholecystectomy recovery. Boore(1978) discovered assessment of pain once a day was inadequate, and she assessed pain twice a day after surgery.

2.5.7 When to administer the scales?

Wolfer (1973) found patients were ready to complete scales by at least

the second postoperative day, although Wolfer & Davis (1970) using longer and more complex scales observed that 24% of females and 28% of males did not feel upto completing the scales until the third or fourth postoperative day. Hayward (1975) found patients could mark simple, rapidly completed scales from the first postoperative day.

2.5.8 Which Techinque For Measuring Pain?

Murrin & Rosen(1985) contend, "There is no single technique suitable for the measurement of pain in the clinical setting. The choice of method is largely dependent upon feasibility in the situation under investigation." p126. This reinforces Reading(1984) who stated, "Having accepted a complex, dynamic model of pain, it follows there is no ideal assessment method. Selection of dependent patient measures will be determined by the context in which evaluation takes place..." p203. Syrjala & Chapman(1984) conclude, "...decisions about pain measurement must depend on the purpose of the individual investigation and the nature of the pain problem being assessed." p73.

2.6 RECOVERY

2.6.1 Introduction

Recovery, like pain and anxiety, is a complex phenomenon, which is thus difficult to define. In hospital, Johnston(1978) argues it is usually measured on a functional level, for example the patients ability to cope at home, rather than physiologically: it is a behavioural concept. Johnston goes on to say little attempt has been made to plot recovery using easily measured physical functions. Infection and other complications are used as indicies, but "more as complications which must be overcome before recovery can begin rather than indicies which chart the patient's recovery." Johnston(1978), p1.

Brown, Buchanan & Hsu(1978) talk about patients progress after surgery as "sick role behavioural measures" rather than recovery. They retrospectively studied 100 patients who had coronary artery bypass grafts. They argued that length of stay in hospital was affected by the acceptance or rejection of the sick role. They described progress after surgery as abandoning the passive role for one of increasing activity. This progress is determined both by the patients attitudes and expectations and reaction to their physical condition, as well as the reaction to all of these by the doctor or nurse: the behaviour of the patient influences their assessment by the health professionals. What Johnston(1978) describes as physical indicators of recovery, Brown et al(1978) see as measures of the sick role.

So whilst recovery usually seems to be defined as a functional and then a physical concept, Johnston(1978) argues it can also be defined as a behavioural and thus psychological concept, whilst Brown et al(1978) view it from a sociological perspective.

2.6.2 Definition of Recovery

Johnston(1978) argues there is a lack of a clear concept of recovery.

She provides four possible definitions of recovery and discusses each. First, she gives a general definition of recovery as, "the process of change from a state of illness to a state of health." p3, but points out illness and health are themselves difficult to define. The second definition is, "the process of regaining the functions which the patient could perform before." p4. Surgical patients may, however, recover to a point beyond that prior to surgery. The third definition follows from the second and involves the patient recovering to their premorbid state. This would involve defining illness, when it started, and an assessment of premorbid function, all difficult to achieve. The fourth and final definition of recovery is as, "the monotonic changes in functioning occurring over time, in groups of patients following surgery." p4. This includes all the non-specific changes following surgery. This monotonic approach would seem to preclude using complications as indicies of recovery as absence of complications is not a change, and a complication would represent a change, but in the wrong direction.

All these definitions of recovery implicitly incorporate a time element. Johnston(1978) argues recovery covers the period until, "a stable level of functioning" p5, is reached. Fordham(1982) describes recovery as the return to such a level of fitness that the patient is not unduly fatigued when resuming full work and leisure. Fordham's definition emphasises more the impact of recovery from illness on the patient rather than specific functioning. Wolfer(1973) differentiates between recovery and welfare. Recovery is, "The process of restoration and/or attainment of normal physiological and anatomical functioning." p396. Welfare is, "The complex, multidimensional, and changing affective and cognitive state of an individual as he undergoes hospitalisation and surgery." p396. In this definition of recovery Johnston's(1978) "monotonic" implications of recovery are inherent, but the definition of welfare does not imply any directional change. Mathews & Ridgeway(1982), in their article reviewing work on personality and surgical

recovery, do not define recovery other than, "the term recovery is taken here to refer to evidence from clinical indications recorded by medical or nursing staff, direct observations of behaviour, and ratings of pain or physical function while in hosptial." p245. This incorporates both physical function and behaviour as aspects of recovery. The definition of recovery used in the present study was taken from Johnston & Lee-Jones(1979) as, "...the systematic, unidirectional changes occurring in patients over time following surgery." p355.

2.6.3 Influences on Recovery

Wilson-Barnett & Fordham(1982) describe recovery as involving family, friends and employers. Past history, risk factors, social support, sex, personality, expectations and ideas about health care, an understanding of illness, the presence or absence of complications, life events, pre-morbid occupation, employers attitude, flexibility of roles, and doctors and nurses expectations and advice all can influence recovery. The influences of anxiety and pain on recovery are discussed on pages 54 to 56.

2.6.4 Measures of Recovery

In the past, criteria have been selected on the basis of the needs of individual studies, rather than with the aim of theory development, Wolfer(1973). Johnston & Lee-Jones(1979) suggest measures that show systematic, unidirectional change may be adopted as measures of recovery. Wolfer & Davis(1970) found self-ratings of pain, emotional state and physical condition were sensitive to individual differences and changes over time, they thus regarded these measures as promising indicies of recovery.

2.6.5 Short Term Recovery

Appendix D.5 shows the variety of different indicies used to measure recovery in different studies. This illustrates the diversity of indicators

used, and that often one or two variables only are assessed. Wolfer & Davis(1970) found there were not one or two measures that adequately reflect recovery. They used a six-point scale to assess their recovery inventory items, which reflected physical condition. They were rated very poor, poor, fair, good, very good and excellent. They also looked at indicators of recovery to reflect patient welfare, such as number of analgesics given. They found considerable variation on all rating scales and inventories and concluded they were sensitive to individual differences. The best approach would seem to be a combination of indicators. Wolfer & Davis(1970) only assessed recovery on two consecutive days and recommended recovery be plotted over several postoperative days.

2.6.6 Criticisms of Recovery Measures

Criticisms of the more commonly used measures of recovery will now be discussed.

Length of hospitalisation is often used to reflect recovery. Johnston(1976) points out this is a poor measure of recovery if patients are under the care of different doctors, as their length of stay may be influenced by policy of the doctor in charge, including the day of the operation, and the day of the ward round. The amount of social support the patient has at home, the availability of transport home, and pressure on beds could all affect the length of stay.

Nursing care required may be a sensitive measure in the early stages, but recovery continues beyond the time when this care is required, after discharge. If only the immediate postoperative recovery period is being studied this is less of a problem. Even if nursing care received is used as a short term measure, it can be influenced by the nurse's workload. As Johnston(1984) points out, the degree of self care is influenced by the presence or absence of willing helpers. Full mobility and speed of ambulation may depend on ward policy as well as the patient state. For

example, a patient may get back into bed unaided, with great difficulty, because no nurse is available to help them. Eisler, Wolfer & Diers(1972) found physical self reports could be influenced by the need for approval. The nurses attitudes may thus affect the speed of ambulation. The nursing model used on the ward (if any) could influence care. For example, if a model encouraging self care was implemented, the patient would be encouraged to undertake self care sooner than perhaps a ward not using such a model, or one where task allocation rather than the nursing process was used, which would affect recovery scores.

If the number of analgesics given is used as a measure of recovery, care must be taken to interpret the results cautiously because it can also reflect ward policy, nursing routine and attitudes of health care professional and the patient towards taking painkillers. So these indicies can be considered indirect measures of recovery, reflecting administrative procedures as well as patient state. Factors such as the removal of a catheter, starting on free fluids and diet reflect the doctors assessment of recovery and are thus an indirect assessment. Appetite can be influenced by the presence or absence of appetising food, and sleep can be influenced by other factors such as noise from nurses and other patients.

2.6.7 Devising A Recovery Inventory

What indicies seem to reflect what Johnston(1978) calls, "a systematic change in the period following surgery"? p5. She argues it is appropriate to include diverse measures of behaviour and mood and to assess current level of functioning: what patients are doing and feeling. If a test is intended to measure some sort of progress, scores should increase over time, and this is, "evidence for the validity of those items", Nunnally(1981) p94.

So, when deciding what to include in a recovery inventory, assessment of activity and physical functioning, behaviour, mood and feelings would seem to be appropriate.

2.6.8 Other Issues

Johnston(1984) raises three important issues. 1) Is recovery a single, unitary process. For instance, Wolfer(1973) differentiated between recovery and welfare. 2) Do current measures describe the process of recovery. 3) What is recovered. To answer these questions she looked at data from 59 women who had major gynaecological surgery. A principal component analysis was undertaken on data obtained on two occasions; two days and one week after surgery. An extensive battery of tests was used to assess recovery. Johnston found four factors emerged at two days after surgery. These were labelled well-being, accounting for 28% of variance, attitude to hospital, accounting for 12% of variance, negative affect, accounting for 8% of variance and passivity, accounting for 7% of variance. Thus 45% of variance was not explained by these four factors. At one week after surgery, well-being accounted for 27% of variance, attitude to hospital for 10%, distress for 8%, effort for 9% and pain for 7%. Thus 39% of variance was not accounted for by these factors. So factors which were replicated at the second testing included well-being, attitudes and distress. Johnston describes the well-being factors as representing recovery. Well-being did not include pain or negative effect. Thus she concluded recovery was not a unitary process. Well-being scores did change between two days and one week postoperatively, attitudes and distress scores did not affect this difference. These changes over time reflect construct validity of these variables as measures of recovery.

Johnston(1984) also parallels the differences in the recovery process with those of disease, impairment, disability and handicap. Disease and recovery from it is a measure of survival and death. Impairment is disturbance of structure or function at organ level. Johnston gives examples of recovery from impairment as measures of lung function, pain and postoperative complications. Disability represents disturbances in function

or activity at the level of the individual and examples include measures of ambulation and self care. Pain could perhaps also be included in this category. Handicap represents disturbances in interaction involving social and physical surroundings, and would include return to work. Johnston(1984) argues these definitions apply to Wilson-Barnett & Fordham's (1982) description of clinical morbidity and patient perceived morbidity. The former represents disease and impairment and the latter disability and handicap. Johnston argues recovery could be studied on all four dimensions. It is likely that the four processes proceed at different rates and will be predicted from different sets of psychological and physiological indicators, and thus suseptible to different types of intervention. Conclusions should thus include all or be limited to the specific processes measured.

3.1 Introduction

This longitudinal descriptive study focused on the nurses' and patients' ratings of pain and pain relief, and included an assessment of anxiety and recovery in order to examine the interrelationship between these variables. A descriptive approach was selected because the study aimed to assess the situation that existed without intervention or testing of new techniques. It was longitudinal to enable pain, pain relief, anxiety and recovery trajectories to be plotted. Table 1 illustrates the time span of the various stages of the research.

Table 1 - Time Span of Research

DATES*	LIT. REV.	STUDY DESIGN	E.C.	PILOT I	PILOT II	MAIN STUDY	DATA ANALYSIS	WRITING REPORT
1983								
Oct.-Dec.	X	X						
1984								
Jan.-March	X	X	X					X
April-June	X		X	X			X	
July-Sept.	X	X			X		X	
Oct.-Dec.	X					X		
1985								
Jan.-March	X					X		
April-June	X					X		
July-Sept.	X					X	X	
Oct.-Dec.	X						X	
1986								
Jan.-March	X						X	X
April-June	X							X
July-Sept.	X							X
Oct.-Dec.	X							X

* - Three month time blocks are used to simplify the table, although some stages were shorter.

LIT. REV. = Literature Review
E.C. = Ethical Clearance

3.2 Aims of the Study

To reiterate, these were to:

a) assess whether pain and/or pain relief affect recovery.

b) determine whether anxiety affects pain, pain relief and/or recovery.

c) ascertain any difference between the patients' and the nurses' ratings of the patients' postoperative pain and pain relief.

d) identify any pain relieving strategies used by nurses and patients.

The major variables in this study were thus pain, pain relief, recovery and anxiety. The way in which they were assessed will be considered after the description of the sample.

3.3 Sample

The sample was one of convenience, and consisted of all patients admitted to the chosen wards for an elective abdominal operation under general anaesthesia during the period of data collection, aged 18 or over and who gave written consent to take part in the study. Excluded were those admitted via the accident and emergency department, those who were taking narcotic analgesics for pain on admission, private patients, those who did not speak English, those with a history of medically diagnosed psychotic mental illness, those already interviewed by the researcher, and those who the nurse-in-charge deemed too ill or otherwise advised exclusion.

Patients were dropped from the study if they became confused or psychotic postoperatively, as assessed by the medical staff, or if the nurse-in-charge advised it, or if they became too ill to continue. Chest infections and wound infections were noted but not seen as a reason to exclude the patient from further interviews.

The list of elective abdominal operations which study patients underwent can be found in Appendix A.5. Patients having gynaecological surgery were not included to ensure there was a fairly balanced distribution

of sex in the sample.

3.4 Research Instruments Used in the Pilot Study

Specific techniques for data collection will now be discussed. This will be structured by considering pain, pain relief, recovery and anxiety in turn.

3.4.1 PAIN

a) Patients Ratings of Pain

Pain was assessed preoperatively, then twice a day for seven consecutive days after surgery, using the patients' subjective report of their pain. Observational and physiological techniques were not used for the reasons discussed in the literature review. The picture emerging from the literature suggested that a verbal rating scale might be more useful for postoperative patients than a visual analogue or graphic rating scale, because it is easy to understand and complete. Although arguably insensitive, because pain would be assessed frequently after surgery, it was felt a simple tool which was quick to administer and easy for patients to understand was vital. The criticism that only pain intensity would be measured, ignoring the complex nature of pain was important. However, there were four reasons for feeling one scale would be practical and sufficient: 1) to reduce demands made on the patient, 2) because the literature review indicated there might be less discrimination in pain language of patients in acute pain, Reading(1982), 3) pain sensation and distress scores were highly correlated when given together, Taenzer(1983), 4) verbal rating scales may measure the affective response as well as sensory response to a greater degree than analogue scales, Syrjala & Chapman(1984).

A 10 cm verbal rating scale using the words 'No Pain At All, A Little Pain, Quite A Lot of Pain, Very Bad Pain and As Much Pain as I Could Possible

Bear' as used by Hayward(1975) was tested in a pre pilot study. Visual analogue and graphic rating scales were also tested to ensure that the verbal rating scale was the most appropriate choice. Horizontal scales were used as Sriwatanakul et al(1983a) found patients preferred them to vertical or curved scales. Also, Dixon & Bird(1981) pointed out there was a possibilty of error using a vertical scale, depending on the angle from which it was viewed. As the scale was used to interview postoperative patients in bed, there would have been a high risk of this error occurring. The patient was asked to place a cross on the scale wherever was most like their pain now. After the interview, this mark was either scored directly or measured and scored depending on the scale used. The scale which the pre-pilot work suggested was easiest for patients to understand and complete was used in the pilot study and the pain score derived from this scale was then entered in the interview schedule.

b) Nurses Ratings of Pain

The trained nurse in charge of the ward was approached upto five minutes before or upto 5 minutes after the patient has been interviewed postoperatively, to obtain their rating of the patient's pain. This rating was transferred to the interview schedule in the same way as was the patient's rating. At the morning interview, the 'early' shift nurses and in the afternoon the 'late' shift nurses were asked to rate the patients' pain. The trained nurse looking after that patient was asked rather than a learner nurse because only qualified staff could assume full responsibility for patient care, and they largely controlled access to analgesic drugs.

c) Reliability

A test-retest reliability coeffiecient was computed by asking the patient to rate their pain at the beginning of the interview and again at the end. It was possible that the patient remembered their earlier rating or

that their pain changed during the interview, both of which could have affected the reliability coefficient and this was borne in mind when interpreting the results.

d) Validity

The theoretical assumption which formed the basis of the study was that the patient was believed. Their ratings of pain were thus taken at face value. Also if ratings of pain changed over time, this was evidence of their validity, Nunnally(1981). The extent to which nurses ratings were reliable and valid was not specifically investigated. Relaibility could not be tested via test re-test correlations, because this would have been re-tested only seconds after the first rating. Validity was not determined by comparison with patients' ratings as the difference between these ratings was being investigated, thus they were not assumed to be the same. They had face validilty as far as they reflected the nurses' perceptions of the patients pain.

e) Limitations

As discussed the verbal rating scale only measured pain intensity. Concurrent validity could not be demonstrated with for example, nurses' ratings of pain or with number of analgesics administered, as there was no evidence that either of these accurately reflected pain. Furthermore, if concepts varied between individuals, it could be argued that no meaningful comparisons could be made between individuals.

3.4.2 PAIN RELIEF

The second variable to be determined was pain relief. This was assessed on a scale similar to the pain scale, using a 10 cm line and the words very like those used by Donovan(1983) of 'No Pain Relief, A Little Pain Relief, Quite A Lot Of Pain Relief, Very Good Pain Relief and Total Pain

Relief.' Pain relief, rather than relative changes in absolute pain scores were assessed as recommended by Huskisson(1983). As he argued, it was, "...better to measure pain relief directly rather than measure absolute pain." p35. All the arguments applied to the pain scale apply equally to the pain relief scale. No provision on the scale was made for the painkillers making the pain worse, but this assumption was subject to verification in the pilot study.

a) Patients Ratings

Pain relief was assessed twice a day postoperatively for seven consecutive days. The patient was asked to put a cross on the scale to mark how much better any painkiller they had been given since their last interview had made their pain. If the painkiller had been given less than 30 minutes previously, (from the time of administration recorded on the drug chart) it was not rated on that occasion, if no painkiller had been given since the last interview, a response of 'not applicable' was recorded.

b) Nurses Ratings

The trained nurse in charge of the ward was asked to assess the effect of the last painkiller administered since 12 midnight that day for each patient, upto 5 minutes before or upto 5 minutes after the patient had been interviewed. This was done at the same time as the pain rating was made. Even if the last painkiller had not been given during that nurses shift, they were still asked to rate its effectiveness, because, ideally, knowledge of its effect was necessary for that nurse to assess that patient's pain relief requirements.

c) Reliability

The pain relief question was not retested at the end of the interview, because whilst pain may have changed, pain relief from the last

painkiller was unlikely to have done so. It was felt repetition of this question could have elicited hostility from patients. There was thus no separate reliability data for the pain relief scale. The reliability of Donovan's(1983) pain relief scale was not reported and it was not clear if any such tests had been undertaken.

d) Validity

The validity of this scale was difficult to assess because pain relief ratings were made for different painkillers given over time for different types of pain. The pattern of relief expected was thus unclear.

e) Limitations

Asking the patient how much better the painkiller made their pain required a retrospective judgement. Again, relief was assessed as a sensory concept, which ignored the motivational and evaluative aspects of pain and its relief. The psychometric properties of this measure were admittedly unknown, and thus results from this scale were interpreted cautiously.

3.4.3 RECOVERY

The third variable to be determined was recovery. For the purposes of this study Johnston & Lee-Jones'(1979) definition of recovery was felt to be most useful. This was, "...the systematic, unidirectional changes occurring in patients over time following surgery." p355. It was decided to assess recovery using a combination of indices taken from the literature which showed change over time in the immediate postoperative period. Wolfer & Davis(1970) had found no support for the existence of one or two reliable indices of recovery which could be used in isolation. Because only short term recovery was being studied, longer term indicators, such as return to work were not included. Nausea and vomiting were not specifically included as

Hayward(1975) and Boore(1978) found them very problematic to record with any accuracy. The following 20 criteria were originally selected for inclusion in the recovery inventory. (After the pilot study two additional items were added to this inventory, see page 156). 1) A stable pulse and blood pressure, as evidenced by observations being recorded 4 hourly or less frequently. The baseline preoperative measure was taken as the second reading made by the nurse after admission, as the inital reading may be elevated by the anxiety generated by admission to hospital. Postoperatively, the 2pm recording was used, because daily observations were recorded at this time. Nurses recordings rather than the researcher's recordings of pulse and blood pressure were used: a) to avoid introducing an unnecessarily technical component to the interview and b) as it was via the nurses recording that progress is usually assessed, despite likely variations of technique between nurses. c) if the researcher measured blood pressure, it would have been at a different time each day. The next recovery indicator was 2) Passing urine as defined as able to pass urine uncatheterised and without the use of anticholinergic drugs. 3) Taking free fluids defined as taking unrestricted oral fluids. This included soup and ice-cream. 4) Taking oral food including any amount, for example, light diet, or type of food. 5) Bowels open without the use of an enema. The use of suppositories and/or laxatives was counted as normal if the patient usually used them. If patients had a colostomy, any bowel action was considered as 'Bowels open'. 6) Being pain free or not wanting analgesics. This was defined as no pain recorded, nothing causing pain or no analgesic wanted in the 24 hours from midnight to midnight that day. Wolfer & Davis(1970) considered pain ratings to be "promising" indices of recovery. 7) Independent in sitting up the bed unaided by the nurse. Aids such as bed rails, sheets and a monkey pole could be used. 8) Independent transfer from the bed to the chair without the nurses help. Aids may be used to achieve this. 9) Independent in washing, unaided by the nurse, The nurse could provide the wash bowl, toiletries and

help wash the back and feet. 10) Independent in walking to the end of the bed, unaided by the nurse. A walking frame or sticks could be used. 11) Independent walking out to the toilet, unaided by the nurse. A walking frame or sticks could be used. 12) Independent walking out of the ward, unaided by the nurse. A walking frame or sticks could be used. 13) Appetite compared to normal as assessed by the patient. 14) Sleep pattern compared to normal, as assessed by the patient. 15) Concentration compared to normal, as assessed by the patient. 16) Lack of fatigue, as assessed by the patient by asking them how much energy they had compared to normal. 17) Lack of anxiety compared to normal. This was assessed by taking the patients anxiety trait score from each day's anxiety state score. This difference was calculated for all patients on each day, and the top 10% (with the highest difference) arbitrarily classed as being anxious. Thus the patient, rather than the sample mean, was used as a baseline for comparison. This was based on the assumption made by Spielberger et al(1983) that, "...the mean S-Anxiety and T-Anxiety scores for normal subjects tested under relatively non-stressful conditions were quite similar." p14. The data reported in the STAI manual revealed an overall difference of only 0.62 between trait and state scores in a sample of working adults. 18) Interest in surroundings compared to normal as assessed by the patient. 19) Absence of Complications. Complications were recorded when any treatment for the complication was initiated and recorded in the notes and/or kardex. 20) Being discharged home was included as a final, global indicator of recovery. The rational being they must have reached a certain stage of recovery for discharge to occur.

These indices were assessed using data from the notes, kardex and patient, once a day postoperatively in the afternoon, for seven consecutive days. Twice daily assessment was not made, because patients potentially may not have been out of bed or washed by the morning visit, making some of the indices impossible to assess. The indices were assessed preoperatively to give a baseline measure, except for discharge home which was excluded from

preoperative calculations.

The assessment of each of these indices was not on a six point scale as Wolfer & Davis(1970) and Johnston(1978) used, but by the dichotomous presence or absence of each item, or whether it was normal or not normal. This approach had also been taken by Minckley(1974) who had used 17 mainly physiological indicators of recovery. It was felt to be very difficult for patients to rate, for example, urination on a six point scale, and complications, anxiety, stable pulse and blood pressure, discharge, and so on were either present or absent. Rather than combine ordinal and nominal scores on an inventory, it was felt to be more sensible to keep to one level of meaurement: nominal. The extra six point rating scales used by Wolfer & Davis(1970) were also felt to represent an unnecessary burden of extra scales to complete for the patient. In the present study, patients scored 1 or 0 for each item, so a total daily score was calculated, which was then converted to a percentage score to allow comparison with patients' own ratings of recovery.

a) Reliability

This was assessed using an alpha correlation coefficient to look at internal consistency. A test-retest correlation was not appropriate because of the changing nature of recovery. Reliability was also enhanced by adhering rigidly to the definitions of each component of the recovery inventory.

b) Validity

This inventory appeared to have face validity from the literature reviewed. In addition, to try and validate this inventory, patients were asked to rate their own recovery. This was done using a question found useful by Wilson-Barnett(1981), 'If 100% is the fittest you've felt recently, how fit do you feel now?' If patients replied with a range, such as, "35-40%", the lowest figure was taken as their rating. Scores of both assessments of

recovery were expected to decrease immediately after surgery, then gradually increase over time.

c) Limitations

The patients' self rating of their recovery could be influenced by the social desirability of the response. Eisler et al(1972) found self reports of physical progress could be linked to the need for approval. This may have augmented these recovery scores. Some items on the recovery inventory, as discussed earlier, could be influenced by factors other than patient state.

3.4.4 ANXIETY

The fourth variable to be assessed was anxiety. After reviewing the literature it was decided to assess anxiety trait and anxiety state using Spielberger, Gorsuch & Lushene's(1970) State-Trait Anxiety Inventory (STAI), form X, see Appendix B.6.1. (Note, in the main study a revised version of the STAI, form Y, Spielberger et al(1983) was used, see Appendix B.6.2.). State anxiety was assessed to detect any changes in anxiety levels over time. Trait anxiety was assessed to determine whether this more stable personality variable affected pain or recovery. This inventory was chosen because both state and trait anxiety could be assessed using very similar forms. It was felt this would make less demands on on the patient and be less confusing for them than using two different tests. The STAI manual data indicated adequate reliability and validity, and it was one of the shorter tests available, useful when trying to keep interview length and thus demands on the patient to a minimum.

The STAI has been used with postoperative patients by Auerbach(1973), Martinez-Urrutia(1975), Chapman & Cox(1977) and Johnston & Carpenter(1980). It has thus been used fairly widely with patients who have undergone surgery. None of these authors report any specific problems when using the scale with

this group of patients.

Anxiety trait is assessed via 20 questions on 'How you usually feel, in general.' There are four response categories for each question which are assessments of frequency: 'Almost Never, Sometimes, Often and Almost Always' and score 1, 2, 3, or 4 (scoring reversed where appropriate). Thus scores can range from 20 to 80. This range of scores also applies to the anxiety state scale which consists of 20 questions on 'How you feel right now, at this moment.' There are also four response categories for the state scale questions which assess intensity: 'Not At All, Somewhat, Moderately So and Very Much So', again scoring 1, 2, 3 and 4 (scoring reversed where appropriate). Each scale takes about ten minutes to administer and when used repeatedly, the state form takes only five minutes to complete, although no time limits are imposed on its use. Complete instructions are printed on each test form, as the inventory is designed to be self-administered. The anxiety state scale is given first, then the anxiety trait scale because trait anxiety is relatively stable, whereas state anxiety could be influenced by administration of the test. The inventory consists of anxiety present items (of which there are ten state and eleven trait) such as 'I feel frightened' or 'I feel upset', which are sensitive to higher levels of anxiety, and anxiety absent items (ten state and nine trait) such as 'I feel calm' and 'I feel relaxed', which operate at lower anxiety levels, according to the authors. The scoring weights are reversed for anxiety absent items. Template keys are available for scoring by hand. If one or two questions are omitted, the score can be pro rated. This is achieved by determining the mean score for the items answered, then multiplying this by twenty and rounding to the next highest number. If three or more items are omitted, the validity of the score must be questioned.

In the present study, anxiety trait and state were assessed preoperatively to provide a baseline measure, and to enable the patients to become familiar with this test. Postoperatively, anxiety state only was

assessed once a day, in the afternoon, for seven consecutive days. Twice daily assessment was not undertaken to minimise demands on the patient. Anxiety trait is a stable measure of anxiety and thus no postoperative measures seemed necessary.

Not all patients would be able to concentrate sufficiently after surgery to self administer the STAI. Chapman & Cox(1977) read the STAI to patients if necessary. In order to standardise its administration in the present study, it was read aloud to all patients, whilst being held so they could see it. The researcher then completed all scales from the patients verbal response.

a) Reliability

Reliability has to be determined using different methods for the state and trait scales. Anxiety trait is amenable to a test-retest correlation, because it is a stable concept. In the STAI manual, high school students had a median test re-test correlation of 0.695, using form Y(1983). College students had a median correlation of 0.765, using form X(1970). The test re-test correlations for anxiety state scales for these groups were 0.34-0.62 and 0.16-0.54 respectively, with a median of 0.33 for both high school and college students. This lower correlation is not suprising because anxiety state, by its definition, is a changing concept. A test of internal consistency, such as the alpha correlation is more appropriate. Working adults were found to have anxiety state alpha correlations of 0.93 using form Y. Anxiety trait scores also show a high internal consistency with correlations of 0.91 using form Y. Alpha correlations for 1173 subjects who completed the STAI in New Zealand were found to be 0.93 for state scales and 0.87 for trait scales by Knight, Hendrika, Waal-Manning & Spears(1983), which confirms the data reported in the manual. The correlations reported in the manual between Form X and Form Y are high at 0.96 to 0.98. Form Y was devised to reflect a 'purer' measure of anxiety: Items linked with

depression such as 'I feel like crying' were replaced. Spielberger et al(1983) prefer its 'superior psychometric properties'. The alpha correlations are 0.05 and 0.01 higher respectively for the state and trait scales on Form Y.

The reliability of the anxiety trait scale was assessed in this study by conducting a test-retest; administering the trait scale preoperatively and again on the seventh day after surgery for the first ten patients. Anxiety state was tested in the same way for these patients for comparison. The reliability of the state scale was assessed using an alpha correlation test, which was applied to the trait scale for comparison.

b) Validity

To demonstrate construct validity of the trait scale, the manual compares the mean scores of neuropsychiatric patients with those of normal groups. In all but one of the neuropsychiatric groups scores were higher than those for normal subjects. This, conclude the authors, demonstrates that the STAI can discriminate between patients for whom anxiety is a major symptom and normal subjects. Also those general medical/surgical patients without psychiatric complications had lower anxiety trait scores than those with these complications. However, no tests appear to have been applied to investigate the significance of these differences. Construct validity of the state scale is demonstrated by military recruits undergoing a stressful training programme having higher state scores than college and high school students who were tested under relatively non-stressful conditions. Military recruits also had higher state than trait anxiety, whereas the two groups of students had quite similar scores. Under imagined exam conditions, college students had higher state scores than when tested in class, and had lower scores after relaxation. Concurrent validity of Form X has been demonstrated by correlations of 0.73 to 0.85 between anxiety trait and other meaures of anxiety.

With this type of inventory, response sets could be a problem, especially during repeated use of the inventory. Johnston & Hackmann(1977) considered this, looking at the tendency of subjects to acquiesce or provide extreme responses. They looked at two different groups of subjects. In the first group 20 subjects were given the state test which was readministered one week later. The second group of six patients completed the state test daily for fifteen days, (not including weekends). They concluded there was no evidence that the STAI was subject to response sets.

In this study validity was assessed by looking for an expected decease in anxiety state over time after surgery.

c) Limitations

These types of questions may be unfamiliar to patients and some might regard the questions as strange or intrusive. The social desirability of their response could influence ratings.

The description of the methods so far has included all components of the first three aims. Methods used to acheive the fourth aim, (to identify pain relieving stategies used by patients and nurses) will be considered next.

3.4.5 Pain Relieving Strategies Used By Patients and Nurses

The patient's strategies were assessed by asking them, each time their pain was assessed, "Does anything make the pain better?", and if so, what? This question was designed to elicit any strategies the patient might have for pain relief. At the end of the entire interview, the patient was asked if anything in particular had made them more comfortable during their stay.

The nurses' strategies were assessed as part of a questionnaire for trained nurses on the ward. The nurse was asked "What would you do if a patient complained of pain and it was not time for them to have another

painkiller for an hour?" This was designed to tap any alternative methods of pain relief the nurses might use, without directly questioning them, which it was felt might elicit hostility if the nurses were not familiar with these methods, or did not use them.

3.4.5 Supplementary Questions in Interview Schedule

In addition to the basic design outlined for assessing pain, pain relief, recovery and anxiety, all part of the interview schedule, this schedule was designed to supplement this information and record data on other factors that seemed likely, after reviewing the literature, to influence the four main variables of this study. The entire interview schedule can be found in Appendix B.1.

a) Additional Questions in the Preoperative Interview

The following background information was collected from the patient; age, sex, ethnic origin, marital status, number of previous operations, diagnosis, ward and consultant. These factors were recorded to assess their effect on the postoperative variables under investigation. The literature review had shown that past research reported mixed results about their effect on the variables being studied. Social class was not recorded because it was felt to be an intrusive classification, especially in a time of high unemployment. The number of nights in hospital pre and postoperatively were recorded. Nights were used rather than days to avoid having to use fractions and the problems associated with determining the exact time of discharge.

In addition to being asked if they had any pain now and rating this on the pain scale, they were asked if anything made the pain worse and if anything made the pain better. Patients expectations of pain and postoperative pain relief could be important, as Wallace(1985) found, so questions on these areas were included. It was felt some patients may refer to their pain as a discomfort, so discomfort was rated twice a day in the same

way as pain, (see Appendix B.5). Mood was assessed during this interview by asking the patient how they felt in themselves. Their usual way of coping was ascertained, to assess the extent to which familiar methods of coping could be used in hospital. This was assessed by asking, "If you feel bad, is there anything you do or think to feel better?" Responses were classified into affective, problem solving, both or neither, as defined by the Jalowiec Coping Scale, Jalowiec, Murphy & Powers(1984). A list of these factors and their classification can be found in Appendix D.3.

b) Additional Questions in the Postoperative Interview

Nurse

The nurses' ratings of pain and pain relief were made by not only asking the trained nurse to rate the patient's pain now, and the effect of the last painkiller, but also by asking whether pain returned between painkillers, and if so, for how long, and how bad this pain was at its worst.

Patient

The patient was asked if any activity had occurred in the last half hour, for example physiotherapy, and this was noted, as was anything which made the pain worse. If patients reported something had made the their pain better, a question was included on who had helped them in this, assuming that alternative strategies, such as relaxation or distraction might be used to assist in pain relief. Patients were asked if they had been given a painkiller, and if so, had this been given from the drug trolley or not. The effectiveness of this painkiller was rated by the patient and whether they wanted another painkiller now was recorded.

Some questions were asked in the morning only. Because pain relief at night was an important area, patients were asked if pain had disturbed their sleep, if anything else had disturbed their sleep and whether they wanted a

painkiller in the night, and if so, whether they received it.

In the afternoon only, patients were asked, "How do you feel in yourself?", as a rough but quick guide to their general mood.

During the final postoperative interview, on the seventh day after surgery, or just before discharge if this was earlier, the patients were asked a further six questions and any comments made were noted. To assess the overall adequacy of pain relief, they were asked 1) How do you feel your pain was controlled overall? Cohen(1980) and Donovan(1983) had found a general question like this elicited a high proportion of 'adequate' replies, so a more specific question was added (see question 3). The degree of control patients had over painkillers seemed important so they were asked 2) Did you know what to do if you had any pain? (and if so what and how did you know) and more specifically 3) Did you feel you could have a painkiller whenever you wanted it or not? Expectations and their fulfillment were assessed by asking 4) Was your pain as you expected? Anything that improved comfort whilst in hospital was assessed as it was hoped this would include various pain relief measures, so 5) Was there anything that made you more comfortable? Finally, although preoperative levels of information were not assessed, and it was assumed information given by nurses was reasonably standard, patients were asked retrospectively 6) Was there anything you would like to have known before your operation?

c) Reliability and Validity

The individual reliability of these supplementary questions was unknown. Questions were assumed to have face validity after consultations with colleagues and the project supervisor. The extent to which patients viewed these questions as meaningful and relevant was determined during the pilot work. The limitations of these questions, other than their superficiality, was the impracticality of including questions on all factors which might exert a potential influence on any of the main variables, so the

researcher selected those which were judged to be most useful.

Methods which seemed appropriate for assessing the reliability of the whole interview schedule were a) Asking the patient to complete a second interview schedule and b) having a second interviewer complete a schedule for the same patient interview.

The first possibility was not adopted as it was felt this would place unnecessary and unjustifiable extra pressure on a patient already undergoing the stressful procedure of admission to hospital for surgery and recovery from that surgery. The possibility of a second rater or interviewer was not used for three main reasons. First it was felt the ward staff would not tolerate the presence of another researcher. Second it was felt the patient may be intimidated by the presence of another person and feel they were being checked up on or 'on show'. Also, as interviewing patients after surgery would involve crouching amongst tubes and drains so as not to necessitate moving the patient unnecessarily, it seemed impractical. It would also be difficult to administer rating scales twice, so only part of the interview could be checked in this way. Third, however subconsiously, if the researcher knew there was a second person recording the patient interview, then her own behaviour and way of administering the interview could be affected. Evaluation of the entire interview schedule was thus not attempted. It was felt this was justifiable in the light of the points just discussed. Considerable training in administering the interview schedule and pilot work were undertaken to produce a standard method of administration.

3.4.7 Nurses Final Questionnaire

The self-administered questionnaire was devised by isolating areas from the literature which seemed important. These areas included 1) Whether nurses expected the patient to ask for a painkiller. Cohen(1980) found 32% of nurses in her sample would wait for patients to request painkillers after surgery. 2) Cohen(1980) and Sofaer(1984) had looked at the nurses aim in pain relief.

This was assessed in this study using Cohen's question wording to see if her results could be replicated. 3) The way in which nurses interpret 'whenever necessary' or pro re nata (PRN) orders for painkillers had been isolated as an area for concern by Mather & Mackie(1983). 4) Following on from this concern, the factors nurses consider when giving a PRN narcotic, 5) or a non-narcotic would be investigated. 6) Beliefs about addiction resulting from narcotic analgesics would be studied because Cohen(1980) found nurses often feared this addiction. 7) A question designed to elicit any alternative methods of pain relief, other than painkillers, used by the nurse was, "What might you do if a patient reported pain, but it wasn't time for them to have another painkiller for an hour?" 8) Both Cohen(1980) and Weis et al(1983) had found most nurses felt pain relief was adequate, so a question would be included to cover this area. 9) Responsibility for pain relief seemed, from Meinhart & McCaffery's(1983) work to be a key to successful pain control. This thus formed the basis for another question. 10) Nurses often commented that prescriptions for painkillers were inadequate, so a question on how satisfied they were with the way postoperative analgesics were written up by the doctors was included. 11) Finally, the nurses were asked if they would be interested in any more information about pain relief. The age of the nurse, qualifications and length of time on that ward completed the questionnaire. The nurses questionnaire can be found in Appendix B.2.

3.5 Training Prior to Conducting Patient Interviews

This was carried out by tape recording the researcher reading the questions and then criticising aspects of the recording, and by conducting five 'mock' interviews with colleagues before starting fieldwork, with critical feedback. The first pilot study acted as further training in the field.

3.6 Technique for Patient Interviews

3.6.1 General

All interviews were carried out by one researcher. Patients received neutral prompts only to any questions, and unclear replies were clarified by asking, for example, 'Can you explain that a bit further?' Leading questions were avoided, and the interview was completed before any informal conversation was encouraged. It was unlikely the researcher would have been able to just complete the interviews and leave. Some 'chat' was necessary to maintain the interest and cooperation of the patient. Personal views and opinions were kept as neutral as possible during this chat.

Although the patient knew the researcher was a nurse, if any requests for information were made by the patient, they were told that as the researcher was not part of the hospital, it was best to check with the doctor or nurse.

It was decided to interview patients rather than asking them to complete diaries or questionnaires so the researcher could have more control over the information collected: the incidence of incorrectly completed, overlooked or misunderstood questions could thus be minimised. Interviewing patients encourages rapport and flexibility. If a question is not understood it can be clarified, Polit & Hungler(1983). The postoperative patient would be less likely to become fatigued by being asked questions than by having to read a questionnaire, an important consideration when this group of patients was being studied. Patients were interviewed on or by their bed in the ward. The main disadvantage of interviewing for the researcher was the time involved, but it was felt this was outweighed by its benefits. Biases such as the researcher positively or negatively influencing the respondent, or missing verbal and non-verbal cues have to be borne in mind. Writing down responses whilst interviewing takes time, can produce errors and may make the patient nervous. For these reasons the interview was structured

and standardised so the wording of questions was the same for all respondents, and recording of responses mainly involved ticking boxes. Polit & Hungler(1983) recommend gaining rapport with the respondent by being neat, courteous and friendly. They argued, "All opinions of respondents should be accepted as natural - the interviewer should never express suprise, disapproval, or even approval." p 318

It was decided to interview patients preoperatively, then twice a day postoperatively for seven consecutive days. Twice daily interviews were chosen because Boore(1978) had found one daily rating could be unrepresentative of the patients suffering. Also, Johnston(1980) found patients still had high levels of anxiety after surgery for, "...at least 5 or 6 days." p151. A study period longer than six days thus seemed appropriate. Swerdlow(1972) commented that the course of postoperative pain was unknown, thus assessment over seven days provided information on this pattern.

3.6.2 Specific

a) The Timing of Preoperative Visits

The patient was visited on the day of admission, and interviewed once signed consent to take part in the study had been obtained.

b) The Timing of Postoperative Visits

A predetermined schedule was devised, see Appendix D.1, so each half hour period between 09:30 and 12:30, then between 14:00 and 17:00 was covered once during the seven postoperative days, but in a different order for each patient, this order being repeated once every seven patients. Using this schedule, for example, patient 37 would be visited at 10:00 and 14:30 on their first postoperative day. Patients were not visited before 09.30 or after 17.00 as it was felt this would have been unnecessarily disruptive for the patient. This staggered schedule was adopted rather than using a random

distribution of times so that if several patients were being interviewed on the same day, the time of the interview needed to be reasonably close together, not for example, one at 09:30, 10:30 and 12:30, to ensure the time frame was adhered to by the researcher. The same time each day was not used, because, if as suspected, painkillers were given on the drug round, it was felt always interviewing the patient when any painkillers were having their minimum or maximum effect would have been unrepresentative of their pain profile.

Although operations were performed in the morning and the afternoon, all patients were visited on the first postoperative morning, rather than 24 hours later, because 'overnight' was felt to be a more important time period than exact hours, especially as morning and afternoon operations were separated by only a few hours.

3.7 Procedure for Preoperative Interviews

The patient's name was obtained from the admissions list, and if criteria for inclusion were fulfilled (see page 122) they were considered potential subjects. The patient was approached on the day of admission and told the researcher was a nurse interested in how patients respond to any pain they might have after their operation, and to do this the help of patients having certain operations was being sought. They were told it would involve answering some inital questions now, for about fifteen to twenty minutes, then being interviewed for about five to ten minutes twice a day after the operation for seven days. By asking these questions, it was explained, it was hoped more could be understood about patients after an operation, and more done to help them. It was emphasised that if the patient did not take part, it would in no way affect their treatment, and if they decided to take part and later changed their mind, they could withdraw at any time. They were reassured that all information would be treated in the strictest confidence and they would never be personally identified. They

were then asked if they would take part in the study. If they agreed they were given a letter restating the above assurances to read and keep, (See Appendix C.1). They were also asked to sign a consent form, (See Appendix C.2). The patient was then assigned a number, which was subsequently used rather than their name. The preoperative interview was then conducted.

Patients were asked to be as accurate and honest as possible when answering questions and completing scales, and were reassured of anonymity. These factors were isolated by Topf(1986) as important in reducing the influence of social desirability on patient responses. The interview schedule was worked through, and where necessary, the patient completed a rating scale.

Preoperatively patients were given a practice pain scale to complete before starting the interview. The STAI was given at the end of the interview, first the state, then the trait scale. Although anxiety state may have been affected by the preceeding interview, the manual states the STAI should be given when a good rapport has been established with the patient, Spielberger et al(1983), which was more likely towards the end of the interview.

Patients were then thanked for their time and help and told the researcher would not visit them on the day of the operation, but would visit the next day to see how they were getting on. They were told it was realised they may not be feeling very bright for the first few days, but it would be very helpful if they could answer the questions as accurately as possible, adapted from Hayward(1975).

3.8 Procedure for Postoperative Interview

3.8.1 Patient

Postoperatively, before the patient was approached, the notes and kardex, both kept at the nurses' station, were consulted for any changes in

the patient. If there was any doubt as to whether the patient should be interviewed, the nurse in charge or doctor was consulted. Operation details, drugs prescribed and any analgesic, sedative or anti-emetic drugs given were all recorded on the interview schedule. The time, drug, dose, route of administration, whether the interval between doses was equal or more than the minimum prescribed, if the dosage was equal or less than the maximum presribed and whether the drug was prescribed on a regular or as needed basis were all noted. The time interval between doses was considered as equal to that prescribed for upto fifteen minutes over this time, to allow for checking and administration of the analgesic. Anaesthetic and surgical techniques were not assessed in detail, and no attempt was made to alter or standardise these practices. Patients in the study were thus as the nurses on the ward would find them in their day to day work. This was felt to be the most realistic approach for a clinical study.

The patient was approached and asked if they remembered the researcher's preoperative visit; they were reminded as necessary. They were then be asked if they would answer a few questions. If they agreed a chair was drawn up and the interview started. Patients were again asked to be as accurate and honest as possible, and assured of confidentiality. The interview schedule was then systematically worked through. The patient was then thanked and told the time of their next interview.

One interview schedule contained the preoperative and all postoperative questions.

Pain, pain relief, and discomfort rating scales were in a booklet, appropriately ordered and stapled together. Each interview used a new booklet and this was presented on an A5 size clipboard. Each scale was turned over, out of view, once completed. The interview schedule was presented on an A4 clipboard. Questions were asked and the responses immediately recorded on the schedule.

Discretion had to be used when asking questions after surgery. If the

patient was asleep, upto two return visits would be made at half hourly intervals to check if the patient had woken, or if any planned nursing activities were likely that would wake the patient. If not, and the patient was still asleep, they were left asleep and a non-response recorded. It was felt unfair and unethical to wake the patient when they needed rest, and could have ultimately reduced rapport and co-operation, being counterproductive.

At the end of the last interview, patients were thanked for their time and help, and told where and when a summary of the report could be obtained. If they expressed an interest, they were then shown their pain, pain relief, anxiety and recovery scores plotted on a sheet of graph paper.

3.8.2 Nurse

Nurses were not asked about the patient's pain in front of the patient, and if it was necessary to move out of the patient's sight, this was explained by saying, "It's important the patient doesn't think I'm checking up on them." A Letter explaining the purpose of the study was available for nurses to read, and was given to the sister of each ward to put on the ward noticeboard, see Appendix C.3. Nurses' oral consent to take part in the study was gained. The researcher introduced herself to the nurse, briefly outlined the study and asked if the nurse would mind answering some questions about that patient's pain. If the nurse agreed, this was taken as informal consent to participate in the study. A more formal signed consent was not used to keep the questioning low key, and avoid the questions being regarded as an intrusive procedure, rather than something which could be answered quickly with the minimum disruption of routine and use of the nurses time. As the data collection would take several months the interview with the nurse was kept as short as possible, taking about one minute to complete.

3.8.3 Final Questionnaire

At the end of the entire study, all enrolled and registered nurses,

(including the ward sister), who had been working on the study wards for at least a week, were given a questionnaire to elicit their opinions on some aspects of pain and pain relief.

This questionnaire was administered during the last two weeks of data collection, with the researcher present while it was completed. This allowed any queries to be answered and ensured nurses did not confer with their colleagues. Each ward sister's permission was sought prior to collecting this data, and any preferred times of administration suggested by the sister respected. Student and pupil nurses were not included, nor were trained staff who left the ward during the course of the study given the questionnaire. If they had been included, the questionnaire content could have been revealed to other trained staff or new students, affecting their responses and possibly their usual care in relation to pain control.

The questionnaire was piloted on a group of six nurses from a different hospital to assess its feasibility.

The nurses questionnaire contained multiple choice questions, (as nurses were familiar with this format from their professional examinations), and interspersed with open ended questions, to maintain interest, as Topf(1986) recommended. Nurses were told it was not a test; it was their opinions that were important. They were assured of complete confidentiality. When completed, the questionnaire was placed in a plain envelope and sealed. The questionnaires were opened together when all had been completed, to maintain anonymity.

3.9 Ethical Clearance

Once the tools to be used and overall design of the study had been determined, a full research proposal was sent to the Department of Health and Social Security (DHSS) for approval, in their capacity as sponsoring body, in January 1984. They did not propose any alterations and approval for the

proposal was given in February 1984.

A hospital suitable for data collection was selected. The hospital was chosen because it had sufficient numbers of patients to participate in the study, had no other nursing research commitments, and was geographically convenient, essential for the fairly long and intense period of data collection planned. The route taken to gain ethical clearance will be discussed as this process took longer than expected - five months. It was the first nursing research proposal that the ethical committee of the hospital concerned had considered, which may have partly accounted for the time taken to reach a decision. On the 5th January 1984 a letter was sent to the Director of Nursing Services,(DNS), to ask if the hospital could be used for the study, and for advice on submitting the proposal to the ethical committee. By the 6th February 1984 no reply had been received, so the researcher telephoned the secretary of the DNS and was told the matter had been referred to the surgical senior nurse manager,(SNM). An appointment was made to see the SNM on the 14th February to discuss the project. The SNM had no objections to the project, and suggested four suitable wards, all caring for patients having abdominal surgery. On the 15th February 1984 the wards sisters who would be involved were approached at a unit surgical meeting, the project was briefly explained to them. They all agreed the study could be carried out on their wards. The DNS and SNM suggested the Chairman of the Surgical Division be approached for advice on contacting the ethical committee. On the 21st February 1984, an explanatory letter and full research proposal was sent to the Chairman of the Surgical Division, asking for advice on gaining ethical clearance and the consent of the consultants involved. When no reply was received by the 14th March 1984, his secretary was contacted and on the 16th March the researcher was notified that a copy of the proposal had been sent to the Ethical Committee and surgeons involved. On the 21st March the Chairman of the Ethical Committee wrote to say proposals were not accepted without a medical author, but the Chairman of the Surgical

Division had agreed to act in this capacity, and the committee would reply in two to three weeks. On 27th April there had been no reply so the secretary was contacted and said they would reply soon. On 11th May there was still no reply; the secretary said one surgeon had now gone on holiday without replying, so now the earliest the reply could be expected was the week ending 25th May. When there was no reply by the 25th May the secretary was contacted again and said she would pursue the matter. On 4th June 1984 the proposal received full ethical clearance from the committee, with no alterations or amendments proposed.

The lessons learnt from this experience include allowing plenty of time to gain ethical clearance and following up delays and silences with telephone calls.

3.10 The Setting

This consisted of four general surgical wards in a London district general hospital affiliated to a major teaching hospital. It had an average bed complement of 359 patients over the period of data collection. Each ward had 28 beds for male and female patients, divided into 4 single rooms and 4 six-bedded cubicles. One of the wards used a single room as its day room, the other three wards had separate day rooms. All wards were part of the main hospital buildings.

The wards were all used by nurse learners who were allocated for a set period only during their training. This was usually 8 weeks for student nurses and 13 weeks for introductory pupil nurses. These two allocations formed the majority of the learners. Other pupil nurses were allocated for 8 weeks, students undertaking integrated courses, degree courses, or who were awaiting final examination results were on wards for variable length allocations. The complement of permanent staff for each ward was the same and included one ward sister, five registered and four enrolled nurses. There were no permanent nursing auxiliaries. These wards consisted of all the

National Health Service wards at the hospital which cared for patients undergoing elective general abdominal surgery.

Four surgical teams looked after these patients. Consultant A had 18 beds for his patients on one ward, consultant B had 19 beds on another ward, and consultants C and D had 6-8 and 14 beds respectively on the third ward. (The fourth ward is not discussed as it closed after the pilot work was completed.)

3.11 Pre-Pilot Study Fieldwork

An evaluation of the proposed pain measurement scales was carried out before the first pilot study was started. The same wards were used for the pre-pilot, pilot and main study data collection. This also served to help the researcher familiarise herself with the wards and staff.

The three different scales were administered to ten patients, who fulfilled criteria for inclusion in the study.

The patients were approached and it was explained that the researcher was interested in seeing which of three scales designed to measure pain patients preferred and found easiest to use. They were asked if they would mind completing some scales, and if they agreed this was taken as verbal consent to continue.

The scales were presented in the following order:-

First, the visual analogue scale, (see figure 3 for an example of this scale), second, the graphic rating scale, (see figure 4) third, the verbal rating scale, (see figure 5). The scales were given with these explanations:-

Visual Analogue Scale(VAS)

"In this scale the left hand side is equal to no pain at all and the right hand side is equal to as much pain as you could bear. The line joining these two points is equal to all the pain between these two points. Please

put a cross on the line in the place you feel is most like your pain now."

Graphic Rating Scale(GRS)

"This scale is like the last one, but there are words written along the line. Again, put a cross on the line in the place you feel is most like your pain now."

Verbal Rating Scale(VRS)

"In this scale there are five different boxes, each with words in. Please put a cross in whichever box you feel is most like your pain now."

The patients were then asked which scale they preferred and why, and what they did not like about the other scales.

The patients were then asked to complete the same three scales, answering the question 'Did the painkiller give you any pain relief?' With the wording 'No Pain Relief, A Little Pain Relief, Quite A Lot Of Pain Relief, Very Good Pain Relief and Total Pain Relief.'

3.11.1 Findings of Pre-Pilot Work

One patient preferred the VAS, two the GRS and four the VRS. Three had no preference. Several problems were encountered with the VAS and GRS. Some patients marked above or below the line, ticked the line, marked either side of the anchor words, drew a horizontal line above or along the VAS or wrote along the VAS. This illustrated the diversity patients exhibited in marking the scales, even though they had been instructed to put a cross on the line in the place that was most like their pain at that moment. This instruction was not reinforced, and if they started to mark the scale in some other way they were not stopped.

No patient changed their preference after the second administration of the scales. Most patients (eight), did not know why they preferred a particular scale, but two patients said some patients may find the VAS and GRS

too confusing and one felt the VAS gave too much choice. It was decided to use the VRS in the study as patients preferred it and found it relatively easy to use, as Kremer et al(1981) had also found.

Another useful point to emerge from this preliminary work was that two patients, when answering the pain relief question, interchanged 'No pain relief at all' with 'Total Pain Relief'. They did not seem to register the word 'Relief'. The wording of the scale was thus changed from 'No Pain Relief At All, A Little Pain Relief, Quite A Lot Of Pain Relief, Very Good Pain Relief, and Total Pain Relief', to 'Pain No Better, Pain A Little Better, Pain Quite A Lot Better, Pain Very Much Better, and Pain Completely Better'. It was felt this wording was less abstract and would cause the patients fewer problems, but this was subject to verification in the pilot study. There were no cases of patients reporting a painkiller had made their pain worse, so this scale rating only improvements in pain seemed justified.

3.12 First Pilot Study

This was carried out during June 1984 on all four study wards to assess the feasibility of the interview schedule design. The researcher again met the ward sisters at a unit meeting to reinforce what the study involved, and it was agreed to start the pilot study the next day. Once on the wards the researcher introduced herself to the staff and explained what she was doing. The patients were selected from the booked admission lists if they fulfilled the criteria of the study. The researcher consulted the medical and nursing notes before approaching the patient and if there was any doubt about the patient's suitability the nurse in charge was consulted. Patients were approached on the day before their operation, and after ascertaining the patient was the right person, the researcher introduced herself, and proceeded as described earlier.

Over a four week period there were nineteen patients booked for admission who fitted the criteria for inclusion in the study. From those

nineteen patients, nine were interviewed preoperatively.

Of the ten that were not interviewed, four could not be interviewed preoperatively, because they were not on the ward by 7pm the night before a morning operation. This usually happened when the patient had been on weekend leave. Three patients booked for admission did not arrive. One patient was transferred to a private ward, which was outside the scope of the ethical clearance obtained, one took part in a medical trial and was not therefore included, and one had a different operation than that stated on the admission list. Of the nine patients who were interviewed preoperatively, three were not interviewed postoperatively: two were discharged before their operations and one was subsequently put on a medical trial. This patient was visited and it was explained that she would not be interviewed after her operation as planned, because she was taking part in another trial and it was felt to be unfair on her to ask her yet more questions. So, out of the nineteen potential patient subjects, six were included in the first pilot study.

It was found that the preoperative interview schedule took upto fifteen minutes to administer, and the postoperative visits lasted from five to ten minutes. This was well inside the estimated time of interviews, and none of the patients or staff expressed any dissatisfaction with the duration of the interviews.

3.12.1 Findings

Full data analysis was not attempted for the first pilot study because it was designed to test the tools and serve as interview practice, and the sample consisted of only six patients.

3.12.2 Alterations Made After The First Pilot Study

a) Major Changes

Two major changes were deemed necessary. This first involved the pain measurement scale. The VRS had been selected for use as already discussed. However, some patients commented that although they still had 'A Little Pain' it was more or less than the day before: They seemed to find the scale too insensitive. It was decided to remove the restrictions of having only five boxes to represent all pain, and keep the same categories, but allow the patient to mark between the boxes if they felt this was more appropriate. Their mark was then measured from the left hand side of the scale to the nearest 5 mm, as shown in Appendix D.2.2. Other investigators have measured to the nearest 1 mm, or even 0.5mm, for example, Revill et al(1976), but it was felt that for patients often lying down in bed, not feeling well, this would impose a sense of accuracy that was more apparent than real. Two of the words in the scale were changed, following the location of another research article after the original scale was designed. This article by Sriwatanakul et al (1982) described 'A Little' as difficult to quantify, and suggested 'Mild' or 'Slight' to be more useful. Sriwatanakul et al (1983a) also found 'Agonising' was judged the best end point by 107 patients compared to other 'end points' including the one previously used in this study, 'As much pain as I could bear'. It seemed, that beyond this latter end point, there could be another dimension of 'unbearable'. So this, together with the results of Sriwtanakul's work lead to the adoption of 'Agonising' as the end point of the scale, and 'slight' in place of 'a little' for the scale used in the second pilot study. The pain scale used after these changes is illustrated in figure 7.

The wording adopted for the pain relief scale after the prepilot work was found to be satisfactory. Like the pain scale, the patients would no longer be restricted to marking one of the five boxes, but could mark between them if

FIGURE 7. Verbal Rating Scale Used in the Second Pilot and Main Study to Assess Pain.

This was the actual scale which patients completed. They were asked to put a cross on this line, wherever was most like their pain now. The distance to the cross was then measured from the left hand side to the nearest 5mm (see appendix D.2.2) and this represented their pain score.

they felt this to be appropriate. The pain relief scale used after these changes is illustrated in figure 8. The scale used to assess discomfort followed the same format and is illustrated in figure 9.

The second major change involved asking trained staff about the patients' pain and pain relief. This had caused several problems. A nurse was not always available for questioning, or she would ask the student, or tell the researcher to ask the student, or the nurse would look at the drug card or in the kardex. In the second pilot study, the nurse directly looking after the patient was asked about that patient's pain and pain relief. This nurse could thus include learner nurses as well as trained staff. Permission to ask the learner nurses these questions was sought from their Director of Nurse Education, and this permission was granted.

b) Minor Changes

Changes in the State Trait Anxiety Inventory

A new form 'Y' became available between the first and second pilot study with more appopriate normative data. Form X derived its applicable norms from 110 general medical and surgical male patients. Form Y used 1,838 working adults, who were heterogenous for educational level and age. This was a welcome development, as some of the Form X questions had caused problems. These included 'I feel rested' being reported as 'Not At All' if the patient had been woken up at night by noise, not because they were anxious. 'I feel over-excited and rattled' often elicited a 'Very Much So' response when the patients knew they could go home, because they wanted to go, not because they were anxious. Both of these items were replaced in the 'Y' form.

Changes in the Recovery Inventory

Two items were added to this inventory - whether patients were taking

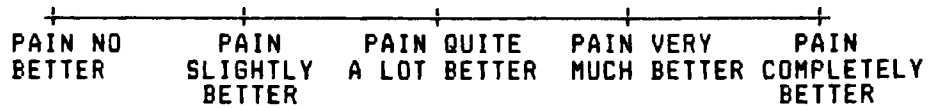

FIGURE 8. Verbal Rating Scale Used in The Second Pilot and Main Study to Assess Pain Relief.

This was the actual scale which patients completed. They were asked to put a cross on this line wherever was most like their pain relief now. The distance to the cross was then measured from the left hand side to the nearest 5mm (see appendix D.2.2) and this represented their pain relief score.

FIGURE 9. Verbal Rating Scale Used in The Second Pilot and Main Study to Assess Discomfort.

This was the actual scale which patients completed. They were asked to put a cross on this line wherever was most like their discomfort now. The distance to the cross was then measured from the left hand side to the nearest 5mm (see appendix D.2.2) and this represented their discomfort score.

30 or 60 millilitres of water an hour, because patients tended to be on these restrictions for a few days. It was initially hoped the inventory could be partly filled in from kardex records and patient notes. This was not often possible because these sources did not contain the information. Patient questions were thus devised to obtain this data.

Additions To Interview Schedule

Several questions were added to the interview schedule after the first pilot study. These were found to be necessary following the types of responses patients made to the schedule and the extra information they volunteered. These included the following:

i) Patients' Preoperative Interviews

a) Some patients mentioned they expected the nurse to know when they would need a painkiller, so a question was added to see how far these feelings applied to the rest of the sample. b) It became clear patients normal methods of pain relief were important, so patients would be asked about their usual methods of pain relief, and their feelings about taking painkillers would be explored. c) A question on how they felt about coming in to hospital for an operation was included, and d) whether they had any specific worries, as several patients mentioned these points in the pilot study.

ii) Patients' Postoperative Interviews

a) A question on how the pain made the patient feel was added after patients rated their pain, as they had been volunteering this information, and there seemed a large variation in their responses to pain. It could be argued that another scale, such as Johnson's(1973) distress scale should have been used to quantify these comments. Although this would have been more specific, 'distress' was too general to cover the feelings patients had

reported. It was felt a description by the patient would be more useful. This was not intended to be a measurement, just a description. The use of another scale here was deliberately avoided. b) Records of the causes of discomfort would be kept, because this information was volunteered by patients, and appeared to be very diverse. Some patients seemed to be bored and depressed during the later postoperative days, so to determine whether this was common, the superficial questions c) 'Do you feel bored at all?' and d) 'Do you feel fed-up at all?' were added.

Deletions From Interview Schedule

i) Patients Preoperative Interviews

Patients had initially been asked how much pain they expected on each day after surgery, for the first seven days. Many patients found this difficult to answer, so these preoperative expectations were confined to those about the first day only after surgery.

ii) Patients Postoperative Interviews

a) A questions about how long pain returned for between painkillers was deleted. Patients were often unable to answer this, and found it very difficult to judge the length of time and remember when the pain returned. This was exacerbated by the presence of incorrect or stopped clocks on the ward. b) The question aimed at ascertaining who helped the patient make the pain better, designed to look at who provided methods of pain relief other than analgesic drugs, was deleted as other methods appeared not to be used, or if they were, they were not recognised as such by the patient.

iii) Nurses' Ratings of Patients' Pain and Pain Relief

a) The nurse often could not answer questions about the degree of the patients' pain relief, the length of time pain had returned between

painkillers, and how severe it was at its worst when it returned. These questions elicited hostility from some nurses, and loss of rapport. It was important to avoid loss of rapport because the researcher would be working in the area for about twelve months. It seemed if these questions were dropped, rapport would be improved. Also, little information was being gained from these questions as much data had to be recorded as 'don't know.' That nurses found the question difficult to answer was interesting in itself, but not sufficently so to jeopardise the rest of the study. b) There were still problems asking the nurse about the patients' pain, especially because of the cut off time of up to five minutes before or after the patient had been interviewed. The nurses were often busy with other patients or off the ward. However, despite these difficulties and attendant low numbers of responses from nurses, the question was deemed sufficiently important to keep it in the interview schedule.

Amendments To The Sample

The first pilot study had used patients undergoing inguinal herniorraphies. It was decided not to use these patients in the rest of the study because they tended to feel better more quickly than patients who had abdominal surgery and they got bored with the questions, the answers to which quickly became repetitive for these patients. It seemed they would need a set of questions designed specifically to measure a more rapid recovery than the questions for those patients who had undergone abdominal surgery. Although this decreased the numbers available for the patient sample, there were still sufficient numbers to ensure the continued feasibility of the study.

After looking at the admissions during the first pilot study, it was decided to form two main groups. The first consisting of all patients having a cholecystectomy and the second comprising all other abdominal operations. The second group would then be sub-divided into all other abdominal surgery with no carcinoma involvement and all other abdominal surgery with carcinoma

involvement. This distinction was made in an attempt to determine the necessity of 'pure' groups which Mathews & Ridgeway(1981) support. They reviewed the literature looking at the influence of personality on recovery, and concluded the use of heterogenous samples, including the type of operation, confounded the results and at least in part explained conflicting results in this area. In the present study, by comparing the 'pure' choleycystectomy group with each mixed sub-group, any significant differences between the groups could be determined. Obtaining 'pure' groups in terms of type of surgery can be time consuming, thus if there were no significant differences between the groups, this would weaken the argument in favour of using pure groups. Patients with cancer were placed in a different group from those without cancer as it seemed the significance of the operation would be different for patients with cancer, possibly affecting outcome measures. Operations for removal of cancerous growths can be more extensive than procedures for other abdominal operations.

Amendments To Administrative Details

On examining the data it became clear preoperative visits were sometimes made after the patient had been clerked by the doctor and sometimes before. To decrease any effect from this variable, (sometimes the patient would discover the full extent of the operation only after the doctor's visit), it was decided to visit patients only after they had been clerked by the doctor and admitted by the nurse. The day of admission was sometimes, but not always, the day before the operation. It was decided to conduct the preoperative interview on the day of admission rather than the day before the operation. This was because during the pilot work it became clear that patients were being lost from the sample as they did not return from weekend leave early enough to be interviewed, and operations were postponed at the last minute making interviewing the day before the operation impossible as the interview had already been carried out. If the patients had bowel

preparation this tended to decrease their ability to cope with the questions as they felt weak or had to constantly rush to the toilet throughout the interview.

Visitors were asked to leave for five to ten minutes whilst the interview was conducted as relatives who stayed sometimes answered questions for the patient or disagreed with them, or the patient asked the relative for their opinion.

Timing of the Interview

Morning visits had been planned to continue until 12.30, but this was changed to 12.15 after the first pilot study as lunches were being eaten after this time.

3.13 Coding

A coding framework was devised for the interview schedule before the pilot work, and revised in the light of its findings. The coding of open ended questions is presented in Appendix D.2.1.

3.14 Coding Error Check

Ten random numbers were generated after all interview coding had been completed, this selected ten interview schedules for independent coding by a person unconnected with the study. This was done after all interviews and coding had been completed to eliminate unconscious bias or extra care being taken with these ten schedules. All pain and pain relief scales were measured and cross checked with the number on the interview schedule. All anxiety scores were rescored and the results cross checked, as was the recovery inventory. All other items on the schedule were then recoded. The percentage of overall intercoder agreement was then calculated, as was a separate percentage for the intercoder agreement over the open ended questions.

3.15 Computer Files

Data files were set up using the Statistical Package for the Social Sciences, version 8 on the Harris 500 computer. Data files were prepared for both pilot studies and the main study. The raw data from the coding sheets were keyed staight into the file, without the use of punchcards. The data were examined for errors via visual checks on line length and for spurious characters. Frequency tables were computed and checked for obvious errors, as recommended by Barhyte & Bacon(1985).

3.16 Second Pilot Study

The second pilot study took place during September 1984, it involved ten patients and was conducted to assess the feasibility of amendments made after the first pilot study. Just before it was started the Senior Nurse Manager informed the researcher that one of the four wards participating in the study was to shut because of financial cut backs. It was decided there would still be sufficient numbers of suitable patients on the remaining wards to continue the study as planned.

3.16.1 Sample Size

Thirteen potentially suitable patients were booked for admission to the wards participating in the study during the second pilot study. One patient had their booked operation cancelled before being interviewed by the researcher and of the twelve who were interviewed preoperatively, two had their operations cancelled, the remaining ten patients completed the pre and postoperative interviews.

3.16.2 Findings of the Second Pilot Study

Basic results only are presented in Appendix A.1. The examination of other relationships such as the influence of preoperative expectations on postoperative outcomes, and the more complex tests to be used in the main study required more than ten subjects to make the test results meaningful, thus were not run on the pilot study data.

3.16.3 Evaluation of Amendments Used in the Second Pilot Study

1) The new method of marking the pain scales and the use of different words did not create any problems.

2) Using form Y to assess anxiety had less problems than the old form X, as the words were larger and the questions were easier to read. The phrases

used on the this inventory caused less adverse comments than those (such as 'I feel blue') used on form X.

3) Asking the nurse looking after the patient about that patient's pain, often a learner nurse, continued to present the same problems as outlined in the first pilot study. However, this was kept in the study as it was felt to be important.

4) Additional questions included after the first pilot study. There were no problems with any of these questions and they were incorporated into the main study interview schedule.

5) Visiting the patient after they had been clerked by the doctor worked well.

6) The time schedule worked very well and was to be used for the main study data collection.

7) No problems were encountered asking relatives to leave whilst the patient was interviewed.

3.17 Main Study

The methods used in the second pilot study worked well and were therfore used unchanged in the main study. The main study data collection took place continously between October 1984 and September 1985. The only breaks were when the operating theatres closed and thus no operations were performed during one week at the end of February 1985 and for five days at the end of August/early September 1985, and for two weeks when the researcher was on holiday.

3.18 Other Action Taken

When the main study data collection was completed, letters were sent to each of the 3 ward sisters thanking them and their staff for their time and co-operation. The senior nurse manager was informed the data collection was complete and that she would be contacted by the researcher when the data had

been analysed and written up. A date would then be arranged to attend a meeting to discuss the results with the sisters, and then to arrange talk ward level at the sisters' discretion. Letters were also sent to the Chairman of the Ethical Committee and Chairman of the Surgical Division informing them the data collection was complete and giving an estimated date when they would receive a copy of the results.

CHAPTER FOUR: RESULTS

4.1 Introduction

The rationale behind the statistical tests used in this study will be discussed, followed by the presentation of the main study results.

4.2 Statistical Tests Used

Non-parametric tests of statistical significance were used with this data as they were considered ordinal in nature, or a normal distribution could not be assumed, which made it unsuitable for parametric statistical analysis. It was recognised that non-parametric statistics were not as powerful as parametric tests in their ability to detect differences and relationships, but that this power increased with sample size, Seigel(1956), and in the present study would be sufficient to detect clinical significance. The level of significance was set at $p<0.05$. Data came from four main variables: ratings of pain, pain relief, anxiety and recovery.

Pain and pain relief scores, assessed using a verbal rating scale, were considered ordinal. This would be subject to confirmation by analysing the distribution of responses over the length of the rating scale. A clustering of responses over words would suggest the data was ordinal, whilst a more even spread of responses would suggest the data was interval in nature.

Although anxiety scores were derived by summing responses to 20 indivdual items (this summation thus treated essentially ranked response scores as interval), it was felt these scores were responses made to ordinal alternatives ('not at all', 'somewhat', 'moderately so' and 'very much so'). Thus although the summed score derived from ranks was still used, data were further analysed using non-parametric tests. This differed from the creators of this test, who used parametric tests, Spielberger et al(1983).

The recovery inventory data was binomial: items were present or absent, normal or not normal. The total recovery inventory score was a

count of the present or normal items, which were then converted to a percentage score. The patient's self rating of recovery, although a percentage score, was treated as ordinal, as no knowledge as to the shape of the distribution was available.

Where appropriate the non-parametric Kruskal-Wallis analysis of variance (H) was computed. Otherwise non-parametric tests of correlation and difference were used. Kendall's tau (τ) was used to test correlations rather than Spearman's rank correlation coefficient (r_s) if many tied ranks existed. Mann-Whitney U tests (U) were used to assess differences when one variable was assessed by two independent groups, whilst Wilcoxon signed rank tests (T or z) were used when samples were related. As sample values almost invariably differ to some extent, these techniques tested whether differences or correlations were genuine, or merely chance variations such as are expected amongst samples from the same population, Seigel(1956) p184.

Although data was considered ordinal, mean scores rather than medians were used in the analysis. This approach was taken because a very good correlation existed between mean and median scores on all the major variables, and it was felt the results were easier to conceptualise in terms of mean scores. Boore(1978) also used mean scores although her data was ordinal.

Non-parametric analysis of variance was used, but mainly univariate techniques were employed to analyse the data. This was undertaken after separate consultations with two statisticians. They both advised the data did not warrant more sophisticated analysis. The possibility of spuriously elevating alpha or the level of rejection when using univariate analysis repeatedly has to be borne in mind, and has been discussed in detail by Cox & Chapman(1976) and Goodwin(1984). Any increase in alpha increases the risk of a type I error, falsely rejecting a null hypothesis. However, this study specifically sought to investigate interactions between variables on a daily basis. Factor analysis and regression analysis were not used for the same reasons, and use of factor analysis especially is a controversial issue

amongst statisticians, for example, Chatfield & Collins(1980) and Hills(1977).

4.2.1 Other points

Missing data were inevitable in a study involving patients who were unwell. Although patients had given informed consent, they were still a captive audience. The researcher was thus ethically bound not to pressurise patients into completing interviews if they were too unwell to do so. The numbers of patient responses to the major variables were thus presented in the tables, in addition to percentages. Unless otherwise stated, percentages were adjusted to exclude missing data. It has to be borne in mind that lower numbers reduce the power of non-parametric tests. Ward names and those of consultants are fictitious to maintain anonymity.

4.2.2 Mean and Raw Scores

Means and medians in many instances rather obscured what was going on, because of the large dispersion of scores around this mean, so relationships were investigated using raw scores. However, because of the large dispersion of raw scores, these relationships, if they existed, were in some cases difficult to detect. This was not unexpected. Correlations, for example, are an assessment of variation about a straight line, thus large variations on either or both sides can potentially reduce the correlation.

This difficulty with means and raw scores reflecting different results to the same question led to another method of analysis being considered. A Fortran program was written by a statistician to try and compensate for the dispersion of raw scores and effects over time on the scores. The way in which this was attempted will be described, using as an example the effect of diagnosis on ratings of pain. Pain was rated fourteen times(twice a day for seven days). Each time pain was rated, the mean score for each diagnostic group was calculated. Individual patient scores within that group were then classified as plus or minus scores from that mean score. This process was

repeated for all fourteen ratings, and when completed, for example, all cholecystectomy plus and minus scores were assembled in one line and all cancer patients plus and minus scores were assembled in another line. A Mann-Whitney U test was then computed to look at any differences between these two groups. This process eliminated the influences of time trends on raw scores, and just looked at differences. This program (see Appendix G) was applied to raw scores of the influences of diagnosis on pain, and of anxiety on pain. These two examples were chosen as they appeared from the mean scores to be most likely to reflect any differences between the groups. However, after running these tests, there were still no significant differences between the groups, so this time consuming and intricate method of further analysis was abandoned. Relationships between the main variables were thus presented using mean scores and raw scores.

Throughout this study percentages were rounded to the nearest decimal place. NS after a p value indicated the finding was not significant, n was used for number of cases, and % to represent percentage values. Tests of significance were two-tailed unless otherwise stated.

The results will now be presented using tables, figures and text. Where appropriate, comments on these results are integrated throughout this section.

4.3 Sample Size

Booked admission lists were consulted throughout the 12 months of the main study. During this time there were 144 patients who were potentially suitable for inclusion in the study on the basis of the information on the admission list: age, ward and diagnosis or reason for admission.

However, fourteen of these patients did not turn up or their admission was cancelled. As their notes were not examined nor the patients approached, it is unknown how many of these patients would have been suitable. Four patients were admitted via the out-patient clinics, but were not on the

admission list. These patients were thus missed.

Of the remaining 126 patients, eight patients who were potentially suitable were missed during the twelve month period as the researcher was on holiday, and one patient was not on the ward from 14.00 to 17.45 on the day of admission, also the day before the operation.

Twenty-five patients who seemed suitable had to be excluded from the study because they did not fulfil the criteria for inclusion. These were broken down as follows:- six had already been interviewed by the researcher after a previous operation, six had a planned admission to intensive care postoperatively, three underwent another operation, (such as varicose vein surgery) at the same time, two were on narcotic analgesics on admission for pain, two were private patients, two did not speak English, one was schizophrenic, one was infectious and had to be barrier nursed throughout hospitalisation, one had a planned spinal anaesthetic and one refused to take part.

It had become clear by the beginning of 1985 that although there were potentially sufficient numbers of patients to complete the proposed sample size of 100, sample attrition, for the reasons discussed, had made this an unrealistic target for the proposed twelve months of data collection. After consultation with the researcher's supervisor and a statistician, it was amended to 80 patients; 20 more would have taken another three to four months to gather.

Thus 92 patients who fulfilled the criteria for inclusion in the study were interviewed preoperatively. Of these six had their operations cancelled after the interview and were discharged, (two were unfit for anaesthetic and the operation was considered unnecessary in the four remaining patients.) Six patients became too ill postoperatively to continue (five went to intensive care and one had a myocardial infarction) and were thus excluded from the study.

The remaining 80 patients completed the preoperative and postoperative

interviews. No patient withdrew of their own accord after starting the study.

Each patient was interviewed upto 15 times (once preoperatively then twice a day for seven days), thus approximately 1,200 interviews were carried out during the main study.

4.4 BACKGROUND DATA - DESCRIPTION OF PATIENT SAMPLE

Table 2 - AGE

AGE	n	%
18-25	7	8.7
26-35	11	13.7
36-45	8	10.0
46-55	12	15.0
56-65	14	17.5
66-75	17	21.3
76 PLUS	11	13.8
TOTAL	80	100.0

Table 2 illustrated there was a wide spread of ages in the sample, with a concentration in the older age groups. The mean age was 54.12 years, with a range of 18-85 years.

Table 3 - SEX

SEX	n	%
Male	38	47.5
Female	42	52.5
TOTAL	80	100.0

Table 3 indicated there was a fairly even proportion of male and females in the sample.

Table 4 - ETHNIC ORIGIN

ETHNIC ORIGIN	n	%
Black	4	5.0
Caucasian	71	88.7
Oriental	2	2.5
Asian	3	3.8
TOTAL	80	100.0

The sample consisted of predominately Caucasian patients, as shown in table 4. Ethnic background was thus not included in further statistical analysis.

Table 5 - MARITAL STATUS

MARITAL STATUS	n	%
Single	19	23.8
Married	38	47.5
Widowed	12	15.0
Divorced/Separated	11	13.7
TOTAL	80	100.0

Table 5 illustrated nearly half the sample were married and nearly a quarter single, the rest being widowed, divorced or separated.

Table 6 - PREVIOUS OPERATIONS

NUMBER OF PREVIOUS OPERATIONS	n	%
None	23	28.7
One	26	32.5
Two or more	31	38.7
TOTAL	80	99.9

This table revealed 63.75% of patients in the sample had some previous experience of surgery.

Table 7 - DIAGNOSIS

DIAGNOSIS	n	%
Cholecystectomy	23	28.7
Other, No Cancer	26	32.5
Other, Cancer	31	38.7
TOTAL	80	99.9

The distribution across groups is shown in table 7. Categories were easily applied. It can be seen 61.2% of patients had operations which did not involve cancer.

Table 8 - WARD

WARD	n	%
Thames	13	16.2
Tamar	48	60.0
Tyne	19	23.8
TOTAL	80	100.0

It can be seen 60% of patients in the sample came from Tamar ward.

Table 9 - CONSULTANT

CONSULTANT	n	%
Adams	51	63.7
Aitken	17	21.3
Abbott	8	10.0
Aslett	4	05.0
TOTAL	80	100.0

As consultants usually had patients only on one ward, these figures corresponded closely with the distribution of patients between wards, (Abbott and Aslett shared a ward) and were not further analysed.

Table 10 - NUMBER OF PRE AND POST OPERATIVE NIGHTS IN HOSPITAL

	PREOPERATIVE	POSTOPERATIVE
Mean	4.28	14.38
Mode	1.00	12.00
Median	3.00	9.00
Range	1-26	3-89

The mean length of time patients expected to be in hospital was 13.76 nights, whereas the actual mean length of stay was 18.66 nights. Patients thus tended to stay in hospital longer than they had originally anticipated.

4.5 RELATIONSHIP BETWEEN BACKGROUND VARIABLES

For the purpose of further analysis, some variables with a wide range of scores were condensed by dividing them into two categories, these categories being determined by a median split. This was done for ease of analysis and so results could be conceptualised. Age was divided into 18-55 and 56 plus. A median split of the number of preoperative nights in hospital revealed the two groups of 1 or 2 and of 3 or more nights. When this spilt was applied to postoperative nights, the groups emerged as 1 to 11 and 12 or more nights in hospital after surgery. The number of previous operations were divided into 0 and into 1 or more operations. This was not a median split, but as the effect of previous operations seemed important, this division appeared more suitable. A Chi-square(χ^2) test was used to look at the significance of any difference between the groups.

Age

Age was paired with each of the eight other background variables used in further analysis. The only significant relationships were between age and marital status, and age and diagnosis.

Table 11 - THE RELATIONSHIP BETWEEN AGE AND MARITAL STATUS

AGE	SINGLE	MARRIED	WIDOWED	DIVORCED/SEPARATED
18-55	14	18	0	6
56 Plus	5	20	12	5
TOTAL	19	38	12	11

χ^2=16.3, df=3, p<0.001

Younger patients tended to be single or married, whilst older patients tended to be married or widowed.

Table 12 - THE RELATIONSHIP BETWEEN AGE AND DIAGNOSIS

AGE	CHOLECYSTECTOMY	OTHER, NOT CANCER	OTHER, CANCER
18-55	13	18	7
56 Plus	10	08	24
TOTAL	23	26	31

χ^2=13.39, df=2, p<0.01

Age had a significant relationship with diagnosis: patients aged 56 years or more had more operations for cancer than the younger age group.

Comments on table 12: It was not unexpected that older patients would be more likely than younger patients to have surgery for cancer as the incidence of cancer increases with aging. Approximately 50% of all cancer occurs in the over 65 years age group, Frank-Stromborg(1986).

Age had initially appeared to be related to the number of nights in hospital, both pre and postoperatively. This relationship was found to be non-significant when the effect of diagnosis was controlled. Thus diagnosis had more influence on length of stay than did age.

Sex

There were no significant relationships between sex and other background variables. Although twice as many females as males had cholecystectomies, and more males had cancer, this was not significant, as table 13 showed.

Table 13 - THE RELATIONSHIP BETWEEN SEX AND DIAGNOSIS

SEX	CHOLECYSTECTOMY	OTHER, NOT CANCER	OTHER, CANCER
Male	7	12	19
Female	16	14	12
TOTAL	23	26	31

χ^2=5.07, df=2, p>0.05

Marital Status

Apart from age, already discussed, no significant relationships existed between marital status and other background variables.

Previous Operations

The only significant relationship was with ward, Tamar ward having three times as many patients who had previous operations than the other two wards. $\chi^2=7.24$, df=2, $p<0.02$

Diagnosis

Diagnosis showed a significant relationship with the number of nights in hospital, both pre and postoperatively.

Table 14 - THE RELATIONSHIP BETWEEN DIAGNOSIS AND NUMBER OF PREOPERATIVE NIGHTS IN HOSPITAL

DIAGNOSIS	NUMBER OF NIGHTS		MEAN	STANDARD DEVIATION	RANGE
	1-2	3 OR MORE			
Cholecystectomy	17	6	2.78	3.73	1-14
Other, No Cancer	14	12	3.38	4.19	1-22
Other, Cancer	5	26	6.16	5.49	1-26
TOTAL	36	44			

$\chi^2=19.03$, df=2, $p<0.01$

Patients without cancer spent less time in hospital before their operation compared to cancer patients.

Table 15 - THE RELATIONSHIP BETWEEN DIAGNOSIS AND NUMBER OF POSTOPERATIVE NIGHTS IN HOSPITAL

DIAGNOSIS	NUMBER OF NIGHTS		MEAN	STANDARD DEVIATION	RANGE
	1-11	12 OR MORE			
Cholecystectomy	17	6	10.00	3.95	6-22
Other, No Cancer	13	13	11.76	5.80	3-24
Other, Cancer	8	23	19.83	17.24	7-89*
TOTAL	38	42			

χ^2=12.34, df=2, p<0.002

* - Only six of these patients were in hospital for more than 21 days.

This table illustrated patients with cancer spent longer in hospital after their operation than patients without cancer. Other relationships with diagnosis were not significant.

Comments on tables 14 and 15: that patients with cancer spent longer in hospital both before and after surgery could suggest they were less well initially and therfore took longer to recover, or that the operation was more extensive and thus preperations and recovery were likely to be longer, or that these patients tended to be older, possibly less fit and so took longer to recover. As diagnosis was found to exert more of an influence on length of stay than age, (see after table 12), the first two explanations would seem more likely.

Ward

There was a significant difference between wards in the length of pre and postoperative stay. Tamar ward patients stayed in hospital longer both pre and postoperatively.

Preoperatively χ^2=8.43, df=2, p<0.001

Postoperatively χ^2=8.60, df=2, p<0.001

Comment: this difference may have been due to differences in the diagnosis of patients between wards, as this has already been shown to influence length

of stay. However, there was no significant difference between diagnosis of patients on these wards, as table 16 showed. Thus length of stay seemed more likely to have been influenced by the surgeons policy on admission and discharge.

Table 16 - THE RELATIONSHIP BETWEEN WARD AND DIAGNOSIS

WARD	CHOLECYSTECTOMY	OTHER, NOT CANCER	OTHER, CANCER
Thames	4	5	4
Tamar	13	17	18
Tyne	6	4	9
TOTAL	23	26	31

χ^2=1.75 df=4 p>0.05 NS

Preoperative Nights

The number of preoperative nights in hospital had a significant relationship with the number of postoperative nights, as table 17 illustrated.

Table 17 - THE RELATIONSHIP BETWEEN PRE AND POSTOPERATIVE LENGTH OF STAY

PREOPERATIVE NIGHTS	POSTOPERATIVE NIGHTS 1-11	12 or more
1-2	30	6
3 or more	8	36
TOTAL	38	42

χ^2=31.14, df=1, p<0.001

The longer a patient was in hospital preoperatively, the longer their stay after surgery, and visa versa.

Comment on table 17: it seemed the length of preperation and the duration of preoperative tests would be longer prior to a more extensive operation, from which recovery might be slower, thus this result was not unexpected.

4.6 MAIN VARIABLES UNDER STUDY

Each of the four main variables of pain, pain relief, anxiety and recovery will be considered separately, then their relationship will be examined. These results will be structured using the aims of the study. To recapitulate these were to:-

1) Assess whether pain and/or pain relief affect recovery.
2) Determine whether anxiety affects pain, pain relief and/or recovery.
3) Ascertain any differences between the nurses' and the patients' ratings of the patients' postoperative pain and pain relief.
4) Identify pain relieving strategies used by the nurse or the patient.

To present the results under the first aim, pain, pain relief and recovery are considered. They are presented separately first, then their relationship will be investigated.

4.6.1 Pain

This was assessed on a verbal rating scale, described in the methods chapter. Pain scores ranged from 0 to 20, with a low score representing low pain, and a high score high pain. Mean pain scores are presented in table 18 and illustrated in figure 10.

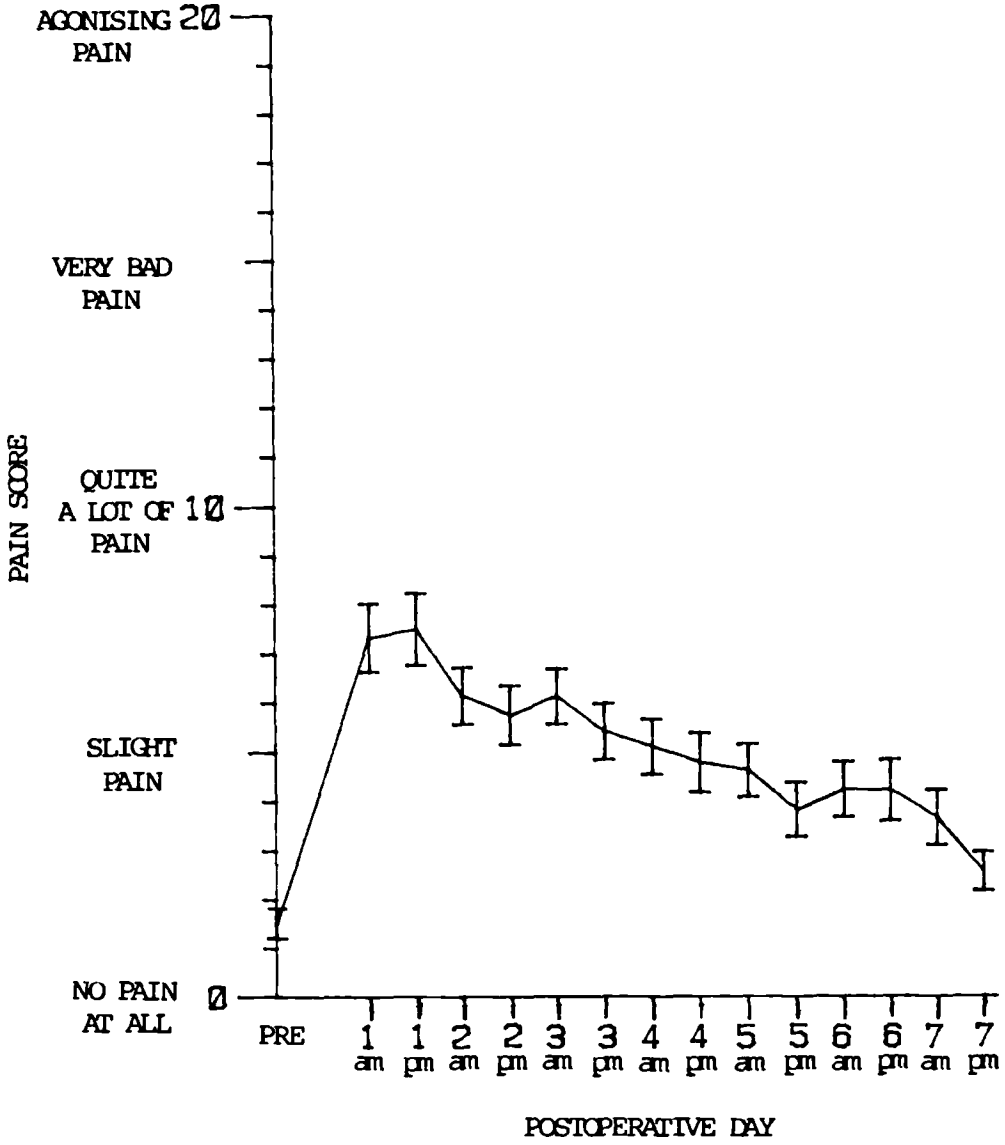

FIGURE 10. Patients' Mean Ratings of Pre and Postoperative Pain.

This graph illustrates the patients mean pain score, with standard error bars (I), both preoperatively (PRE) and twice a day (am and pm) during the first seven postoperative days.

Table 18 - PRE AND POSTOPERATIVE PAIN SCORES

DAY	MEAN	STANDARD DEVIATION	n
Preoperative	1.50	2.79	80
Postoperative			
1am	7.33	6.15	78
1pm	7.51	6.07	68
2am	6.14	5.10	76
2pm	5.75	5.17	73
3am	6.13	5.01	80
3pm	5.42	4.76	69
4am	5.11	4.72	71
4pm	4.79	5.12	73
5am	4.63	4.67	74
5pm	3.83	4.68	71
6am	4.24	4.82	73
6pm	4.22	5.04	66
7am	3.66	4.70	71
7pm	2.56	3.39	69

Mean pain scores peaked on the first postoperative day, then gradually declined until the afternoon of the seventh day. Pain scores on this final afternoon of assessment were still higher than preoperative scores. Note the standard deviation was high, but consistently so, with scores from 1am to 7am within 1.48 standard deviations of each other.

Comments on table 18: an interesting finding from mean pain scores was the consistently large standard deviation in the scores throughout the seven postoperative days. This indicated there was a wide dispersion of scores over this time. Whether this difference could be explained by the different diagnosis or other variables in the heterogenous sample will be examined later. It seemed to suggest that patients, whilst following a general trend of decline in pain scores after surgery, did not all closely correspond to this trend.

Boore(1976) reported twice daily mean pain scores over seven postoperative days. She found all mean pain scores, as in the present study, were less than 'quite a lot of pain'. This scored 10 in the present study and 5 represented 'slight' pain. All Boore's mean scores from the second postoperative afternoon onwards were below 'slight' pain. These results

corresponded fairly closely with those of the present study, although Boore's later postoperative scores were slightly lower than those in the present study. This could have been accounted for by the presence of hernia patients in Boore's sample, who may have had less pain on the later days. Furthermore, the numbers of patients in her sample dropped rapidly after the fourth day, so her mean scores were based on a sample of 22 or less after the fourth day, and on as low as three by the seventh day. In the present study, mean scores were based on at least over 65 patients on all these days.

a) Preoperative Pain and Expectations of Pain

Before surgery, 71.8% of patients had 'no pain at all' and 24.4% had 'slight pain' or less. The amount of this preoperative pain was not significantly correlated with postoperative pain on any day. Also, the amount of pain patients said they expected on the first postoperative day showed no significant correlation with actual pain ratings on this day, r_s -0.04, $p>0.05$. The amount of pain patients expected on the first day ranged from no pain to agonising pain, as table 19 showed.

Table 19 - RANGE OF EXPECTED PAIN ON THE FIRST DAY AFTER SURGERY

PAIN SCORE	PAIN DESCRIPTION	n
0	- NO PAIN AT ALL	15
5	- SLIGHT PAIN	6
9		1
10	- QUITE A LOT OF PAIN	12
12		1
15	- VERY BAD PAIN	8
20	- AGONSING PAIN	3
88	- DON'T KNOW	34
	TOTAL	80

Comment on table 19: the wide variation of expectations, together with the large numbers of patients who did not know what to expect, suggested patients were not receiving specific information on this aspect of their postoperative

course. This was supported by comments from some patients that they had only been told, "You'll be a bit sore for a few days." It seemed this explanation was interpreted variably by different patients. The lack of correlation between preoperative expectations and ratings of postoperative pain supported the findings of Cohen(1980), despite her assessing these preoperative expectations of pain retrospectively, after surgery.

Patients were also asked about their pain retrospectively in the present study, at their last interview. Their responses are shown in table 20.

Table 20 - WAS PAIN AS PATIENT EXPECTED?

RESPONSE	%
Less Pain Than Expected	31.9
Pain As Expected	13.9
More Pain Than Expected	36.1
Different Pain Than Expected	11.0
Didn't Know What To Expect	7.0
TOTAL	99.9

Comments on table 20: these findings again suggested generally inaccurate expectations before surgery. They also partly supported those of Cohen(1980) who found 38.5% of patients experienced more pain than they expected. Her results for pain being less than or as expected were slightly different with scores of 21.1% and 40.4% respectively. Thus more patients in her study reported pain was 'as' or 'less than' expected. However, Cohen did not use the categories 'different than expected' or 'didn't know what to expect', which may have at least partly accounted for this difference.

These expectations were retrospective judgements and Mechanic(1974) pointed out that successful adaptation requires a change in attitudes and perspective that are sufficiently subtle so the person hardly recognises the change themselves. So perhaps if patients felt their pain was less than they thought, even if pain control had been poor initially, this may represent a

good adaptation to events after surgery, rather than a poor memory.

b) Postoperative Reports of Pain

i) Patterns of Pain Masked by Mean Scores

The high standard deviation caused mean scores to rather obscure what was going on. Furthermore, mean scores may not have been the most useful way of looking at the data, because responses from both patients and nurses on the verbal rating scale were found to be clustered over words. These values are tabulated in Appendix A.2. The scores indicated that patients conceptualised the scale very much as ordinal, not interval. Patterns which were masked by looking at mean scores are shown in table 21.

Table 21 - THE PERCENTAGE OF PATIENTS WITH SCORES OF 'QUITE A LOT OF PAIN' OR MORE

POSTOPERATIVE DAY*	'QUITE A LOT OF PAIN' OR MORE %
1	43.25
2	32.80
3	30.35
4	28.45
5	19.95
6	21.55
7	12.05
MEAN	26.91

* The mean of the twice daily score was used as a daily score to simplify tables.

This table illustrated a range of between 12 and 43% of patients, when questioned, had 'quite a lot of pain' or more until the seventh postoperative day. Also, 21.85% of patients rated their pain as 'very bad'

or worse when questioned on the first postoperative day. One patient said "I didn't believe you could have so much pain. I didn't know if it would ever finish, it just went on for ever." Another patient said "I can't stop the pain - it's all the time." The figures in table 21 reflected the percentage of patients on each day with this amount of pain. Looking at individual patients over the seven postoperative days, 75% of patients had rated their pain as 'quite a lot' or more by day three at least once, as had 69/80 or 86.25% by day 7. There was a range of 1-13 and a mean of 3.44 reports of this intensity per patient.

Comments on table 21: This table supported the findings of Cohen(1980) who interviewed patients on their third postoperative day. Although pain was assessed differently, 75.2% of patients had been in moderate or marked pain distress during the period since surgery. In the present study, when interviewed, 30.35% of patients had 'quite a lot of pain' or more ON day 3, but 75% had reported 'quite a lot of pain' or more BY day 3. This percentage was very similar to that found by Cohen(1980). That 86.25% of patients had experienced 'quite a lot of pain' or more at least once when interviewed, arguably represented an unacceptably high level of pain. It was possible the present study figures under-represented the percentage of patients who had 'quite a lot of pain' or more, as patients were asked about their pain now, that is, at the time of the interview, not about any pain that occurred that day before the interview. Asking the patients 'Does anything make the pain worse?' may have elicited reports of pain that occurred between interviews, although this 'worse pain' was often transient, such as on moving or coughing. The extent to which the 'very bad pain' or more, experienced by over one-fifth of patients on the first postoperative day, damaged their morale, reduced their mobility and thus increased stasis complications can only be speculation. Pain on the first day however, had a marked effect on anxiety throughout the first seven days, as discussed later.

The spread of these reports over time is interesting, as table 22 revealed.

Table 22 - TIME RANGE OF REPORTS OF 'QUITE A LOT OF PAIN' OR MORE

POSTOPERATIVE DAY	'QUITE A LOT OF PAIN' OR MORE %
1	22.9
2	17.8
3	16.7
4	14.9
5	10.5
6	10.9
7	6.2
TOTAL	99.9

This table showed 57.4% of these reports occurred during the first three days after surgery, with the remaining 42.5% reports being made after the third postoperative day. Thus a large proportion of these reports occurred during the later postoperative days.

Comments on table 22: traditionally, most pain is expected for only the first two or three days after surgery. As 'quite a lot of pain' appeared to persist beyond this time, a situation could arise where a patient complaining of this much pain during the later postoperative days is not taken seriously. However, the findings suggested these levels of pain persisted, although the pain may have been of a different nature.

Before surgery, patients felt they would want a painkiller when their pain was, on average, at 11.43 on the verbal rating scale, just more than 'quite a lot of pain'. These responses ranged from pain at 2 (between no pain and slight pain) to pain at 20 (agonising pain). Thirteen patients did not know when they would want a painkiller.

Comments: the range of responses concerning when a patient would want a painkiller were diverse, and indicated the variety of pain different patients seemed prepared to tolerate before asking for a painkiller. That 13 patients

did not know when they would want a painkiller suggested they might need guidance from the nurse.

Interestingly, overall, nearly 9.5% of patients with quite a lot of pain or more did NOT want a painkiller when questioned. The breakdown of this 9.5% over the seven postoperative days is shown in table 23.

Table 23 - 'QUITE A LOT OF PAIN' OR MORE BUT NO PAINKILLER WANTED

POSTOPERATIVE DAY	%	n*
1	16.25	13.0
2	11.25	9.0
3	11.87	9.5
4	5.00	4.0
5	6.87	5.5
6	10.62	8.5
7	4.37	3.5
MEAN	9.46	7.6

* Half numbers occur because the numbers refer to a daily average of two scores

Why did these patients not want a painkiller? They frequently feared addiction. One patient said, "I don't want to get too attached to them." and another said, "Once you get used to them you've had it." Many patients made comments such as these. This fear of addiction was often reinforced for patients by the nurse overtly, "The nurse said I shouldn't as I don't want to get addicted to them", less overtly, "they're trying to keep me off them", and covertly, "The nurses convey its a bit naughty to take a painkiller." Some patients did not like the effect of narcotics, "Its a funny feeling - I hate it, not being yourself." Or they wanted to see what they could stand, "It's no good to keep on taking painkillers, I'll stick it out." and "It's funny how you mentally fight not to take a painkiller - it must be independence - you want to see how you can get on on your own." Other patients commented they had not been brought up to ask for painkillers.

Comments on table 23: It seemed the most usual reason for refusal to take a painkiller was fear of addiction, often reinforced by the nurse. This finding supported that of Cohen(1980) who found nurses greatly overestimated the risk of addiction. It was not suprising that this fear of addiction was transmitted to the patient. For example, before surgery 77.5% of patients said they preferred not to take a painkiller or would only take one if the pain was bad, (see table 91). If patients avoided taking painkillers, or at least wanted to convey this for whatever reason, it would seem very easy for them to be dissuaded from taking them by the nurse. Not only would an implicit or explicit request by the nurse to manage without painkillers have reinforced what many already felt, but, at least for some patients, that the nurse (an expert) suggested it, would have provided added weight. In a perhaps extreme scenario, if a patient insisted on painkillers, the other (conforming) patients and the nurse may suspect they were an 'addict'. One patients in this study remarked, "I'm not like that guy over there, he always wants them." This scenario may seem extreme, however, one patient in this study was placed in exactly this position. The kardex for her second evening after a cholecystectomy noted, "Complaining of much pain and extremely upset. Believing she has not got adequate analgesia, but settling late." The following day, her second postoperative afternoon, the doctor wrote on the prescription for Papaveretum 15mg 4-6 hourly, "Only if severe nocte." and, "Paramol for routine analgesia." The patient said she had been requesting analgesics "on the dot". She felt, "They (the nurses) thought I had a habit of relying on them too much" but added, "I just wanted them for the pain and to stop the pain, not for attention." This case study report was supported by the finding that 87.5% of nurses overestimated the risk of narcotic addiction, as described by Porter & Jick(1980) as being less than 1%, or 'almost never'. There were many reasons, some unfounded, for patients avoiding painkillers, despite experiencing 'quite a lot of pain'. The unfounded ones, such as fear of addiction could be counteracted by the nurse.

However, in this study, nurses did not seem to be convinced themselves, thus would need to be given information about addiction potential, or lack of it, before they could be expected to encourage patients to take adequate painkillers. More deeply entrenched stoical attitudes, on the part of the patient and/or the nurse, would be more difficult to alter, and could form the basis of conflict if the nurse and patient differed on this point. Nurses commented that one of the aims of giving painkillers was so patients could mobilise and thus prevent stasis complications. This did not seem to have been articulated to the patient, indeed moving and coughing were mentioned most frequently by patients as making their pain worse, see table 25. However, patients also refused painkillers for other reasons, such as they made them feel strange. If they felt taking a painkillers outweighed its benefits, perhaps the nurse should respect this and provide alternative forms of pain relief. The most important point would seem to be that the nurse and the patient need to discuss this together and reach a joint decision.

ii) The Effect of Physiotherapy on Pain

Physiotherapy in the half hour before the interview had no significant effect on pain ratings. One patient did, however refer to the physiotherapist as the 'physioterrorist' after a painful session. Other activities in this half hour, such as walking/washing, had a significant effect on pain on days 2am (χ^2=9.12, $p<0.01$), 6am (χ^2=6.35, $p<0.05$) and 7pm (χ^2=5.16, $p<0.02$). Thus activity in the half hour before the interview increased pain on these occasions.

Comments: it seemed that although physiotherapy was painful at the time of treatment, this did not have a lasting effect on pain. The number of patients having physiotherapy in the half hour before their interview was low, (between 0 and 9, mean 2.4), thus this finding cannot be generalised to all other occasions of physiotherapy in this study with any confidence. Other

activities such as washing and walking were more likely to take place in the half hour before the patient interview, and did show a weak relationship with increased levels of pain. A significant relationship occurred on the second postoperative morning, possibly when patients were washing themselves for the first time, and on days 6am and 7pm, when patients were more likely to be mobilising and looking after themselves.

ii) The Effects of Pain on Patients General Feelings

Patients were asked how any pain made them feel, and the results are presented below, twice daily scores being averaged to give one daily score.

Table 24 - EFFECT OF PAIN ON PATIENT

EFFECT	DAY %						
	1	2	3	4	5	6	7
Tired/Weak/Ill	39.22	38.61	29.17	35.00	29.17	30.43	28.81
Doesn't Bother	27.45	27.72	27.08	30.00	43.05	40.58	44.06
Miserable	10.78	11.88	5.21	6.25	11.11	4.35	6.78
Sick	1.96	3.96	11.46	1.25	5.50	2.90	8.47
Cannot move	1.96	2.97	0.00	3.75	0.00	0.00	0.00
Uncomfortable	6.86	1.00	4.16	5.00	1.39	4.35	0.00
Other	11.76	13.86	22.92	18.75	9.72	17.39	11.86

This table showed 28-39% of patients felt tired/weak/ill because of pain. This number was fairly stable throughout the postoperative period, and showed only a slight decline over time. The number who said pain did not bother them increased over time from 27-44% of patients.

Comments on table 24: Pain still made over a quarter of patients feel tired/weak/ill on the seventh day after surgery. The extent to which pain actually caused these feelings was unknown, but that the patient felt these feelings were caused by pain was important. It illustrated the substantial effects pain had on patients, especially over time. One patient said, "As

the days go on you can't take so much, it wears you down." Another added, "Pain really grinds you down" and another, "You'd expect to get used to the pain, but you don't." and, "If you suffer alot I suppose you get used to it, but to me it's all new." These comments indicated the effect pain must have had on the patients morale. Pain was deemed as responsible for making a smaller percentage of patients feel sick. This would not be likely to promote recovery via ambulation, fluid intake or morale.

All these responses again emphasised the beneficial effect relief of pain could have on the patient.

Figure 11 illustrated 'pain now' and 'pain at its worst' scores. Patients were asked at their twice daily interviews if anything made the pain worse, and if so, what and how much worse was it then. The results of these questions are presented in tables 25 and 26. An average score per day was used to simplify tables.

Table 25 - FACTORS MAKING THE PAIN WORSE

DAY	ITEM			
	Moving/Coughing	Nothing	Gas Pains	Other*
	%	%	%	%
1	72.45	11.60	0.00	15.90
2	68.45	16.00	0.00	15.55
3	51.35	20.55	5.70	22.40
4	47.40	18.75	5.80	28.05
5	48.65	26.05	9.60	15.70
6	35.35	33.65	7.90	23.10
7	30.50	39.90	5.70	24.26

* Other included responses which comprised 5% or less of the total, and mixtures of responses (also comprising 5% or less).

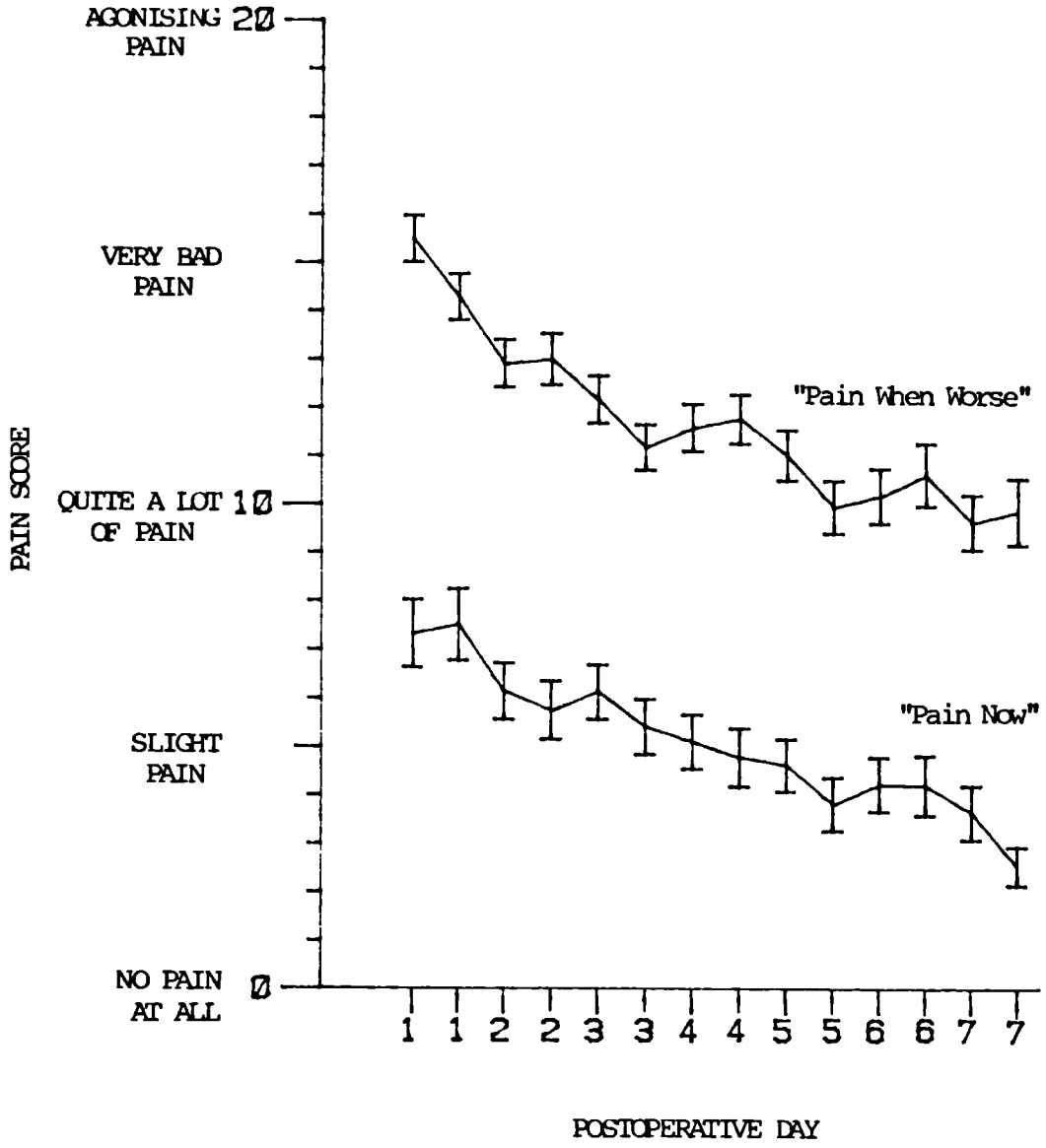

FIGURE 11. Patients' Mean Ratings of "Pain Now" and "Pain When Worse".

This graph illustrates the patients mean scores when they were interviewed ('Pain Now') and how bad the pain was when anything made it worse ('Pain When Worse'). Both scores are presented with standard error bars (I). Scores are all postoperative, and were derived from twice daily ratings (am and pm) during the first seven postoperative days.

Table 26 - PERCENTAGE FOR WHOM PAIN 'WHEN WORSE' WAS 'VERY BAD' OR MORE

DAY	% VERY BAD OR MORE
1	69.55
2	54.25
3	33.40
4	34.55
5	23.45
6	23.30
7	20.50

This illustrated a spread of responses over time, with one-fifth of patients still having very bad pain or more when their pain was made worse on the seventh day after surgery. On the first postoperative morning, 31.1% of patients reported agonising pain when their current pain was made worse. One patient commented "When the pain was bad, I wondered if I would survive."

Comments on tables 25 and 26: Moving and coughing accounted for the most frequently mentioned factors which made the pain worse. Although this was not an unexpected finding, the duration for which these fators made pain worse, and the amount of pain they caused was perhaps more suprising. Towards the later postoperative days, when the patient was expected to be mobilising, moving and coughing still caused a worsening of pain for over 30% of patients, and when pain was worse, it was 'very bad' or more for over a fifth of patients. It was important to consider the effect this level of pain had on the patient. If they were in 'very bad' or 'agonising' pain when they moved or coughed, it was likely they would have avoided moving and coughing, increasing the risk of stasis complications, and impeding their return to normal activities. It seemed the intensity of these exacerbations of pain needed to be lessened.

Gas pains often took the patients by suprise, as they tended to start just as the patients felt they were getting better. Some patients mentioned they were frightened by these pains, found them worse than the pain from the operation, and did not know if they were normal. This indicated a need for increased information about what to expect after surgery.

4.6.2 Discomfort

This was fairly constant throughout the postoperative period, with mean values between slight and quite a lot of discomfort, as figure 12 showed. Initially various tubes, such as intravenous infusions and drains, caused discomfort, then it centred on more general discomfort, on sore bottom/back/heels and on wound discomfort. Table 27 showed the distribution of 710 reports of discomfort from over the seven postoperative days.

Table 27 - DISCOMFORTS AFTER SURGERY

DISCOMFORT	%	n
Wound	14.08	100
Tubes	11.55	82
General	7.61	54
Sore Bottom/Back/Heels	5.21	37
Breathing	4.37	31
Lying Still	4.22	30
Pain	3.52	25
Wind	3.38	24
Hot/Cold	3.24	23
Dry Mouth	2.68	19
Passing Urine	2.54	18
Movement	2.54	18
Nausea	2.39	17
Sore Throat	1.55	11
Tired/Weak	1.41	10
Bowels	1.41	10
Headache	1.12	8
Pulling/Dragging	0.70	5
Dizzy	0.70	5
Other*	25.77	183
TOTAL	99.99	710

* Other - Many patients had combinations of discomforts, or discomforts unique to them.

Comments on table 27: Being in hospital and having surgery seemed, not suprisingly, to be an uncomfortable event. It was associated with various discomforts, which this table revealed were diverse. Many discomforts were unique to particular patients and individual assessment and nursing care

could have alleviated at least some of these discomforts. Discomfort could be interpreted as a 'low' pain rating, as it was, for example, in the present pain intensity scale of the McGill Pain Questionnaire (which consists of the words 'no pain', 'mild', 'discomforting', 'distressing', 'horrible', and 'excruciating'). Whilst discomforts may have contributed to pain ratings, table 27 indicated the discomforts themselves were not always related specifically to pain. For example, whilst a 'sore tummy' could be interpreted as a low rating of pain, being hot or cold, or feeling sick were more specific discomforts and as such not directly related to pain. Discomfort thus appeared to be more of a general rating than one of only low levels of pain.

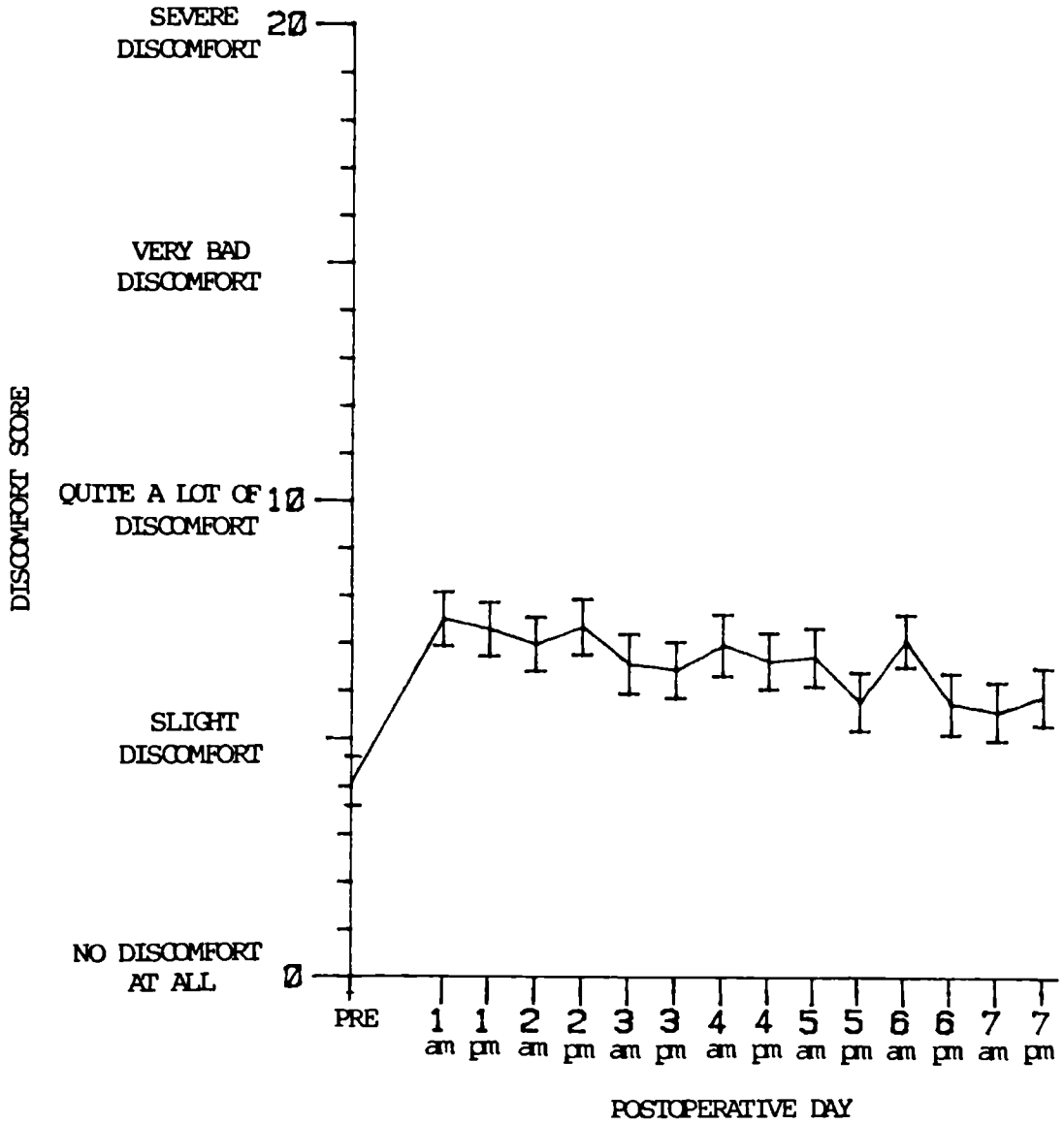

FIGURE 12. Patients' Mean Ratings of Postoperative Discomfort.

This graph illustrates the patients mean discomfort score with standard error bars (I), both preoperatively (PRE) and twice a day (am and pm) during the first seven postoperative days.

4.6.3 Pain Relief

This was assessed on a verbal rating scale described in the methods. Pain relief scores ranged from 0 to 20, with a low score indicating poor pain relief, and a high score good pain relief.

Table 28 - POSTOPERATIVE PAIN RELIEF

DAY	MEAN	STANDARD DEVIATION	n
PRE(expected)	12.63	6.03	58
1am	10.19	5.20	57
1pm	10.57	5.13	35
2am	10.78	5.23	51
2pm	11.06	5.66	31
3am	9.78	5.13	42
3pm	9.63	6.03	27
4am	8.43	6.60	30
4pm	10.83	5.64	24
5am	8.50	6.33	32
5pm	8.90	5.07	22
6am	8.51	5.85	27
6pm	8.82	5.73	17
7am	8.87	5.10	24
7pm	8.75	5.27	12

This table was represented graphically in figure 13. Note that the effectiveness of painkillers declined on the third postoperative morning, then, apart from a peak on the fourth morning, levelled off and stayed fairly constant. The number of patients was low because not only did the patient have to feel well enough to answer the question, but they also had to have taken a painkiller, hence the decrease of responses over the postoperative period. Again, there was a large, constant standard deviation.

These mean scores again obscured interesting details. Overall, for all patients throughout the first seven days after surgery, painkillers made the pain slightly better in 38% of responses and very much better in 27% of responses, (see table 98 for full details).

Comments on table 28: the decline in the effectiveness of painkillers on the third postoperative day may have been associated with the drop in the

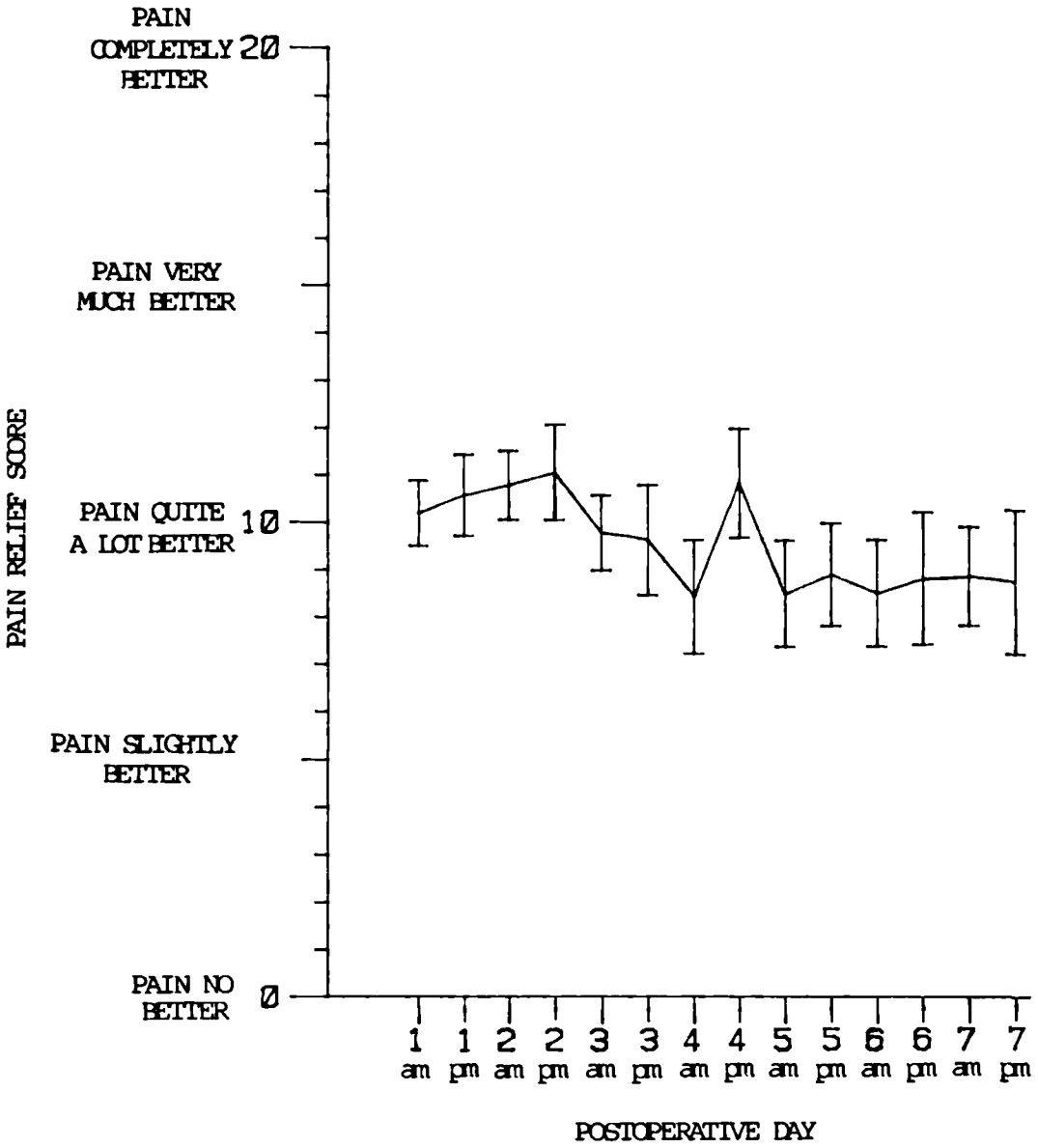

FIGURE 13. Patients' Mean Ratings of Postoperative Relief.

This graph illustrates the patients mean pain relief scores, with standard error bars (I), twice a day (am and pm) during the first seven postoperative days.

number of narcotic prescriptions from day 3 onwards, when the controlled drug prescription ran out, unless actively renewed. This will be discussed further when the types of painkillers given per day are considered. Also, the pain on later postoperative days may have been different from that on the first days, as the gastrointestinal tract started to work and the patient started to mobilise. Thus changes in effectiveness may have been due to different painkillers, and/or different types of pain. The outcome of analgesic administration was variable. One patient said, "Painkillers aren't very effective, its mostly a question of waiting." This suggested painkillers should not be given and just assumed to have worked. Bond(1970) described the outcome of analgesic administration as, "totally unpredicatable." p203. Thus the effectiveness of analgesics needs to be assessed with each patient: it is not enough to assume they have been effective.

a) Expectations of Pain Relief

The pain relief patients expected on the first day after surgery was not correlated with relief obtained on this day, $r_s = +0.06$, $p > 0.05$. Overall, patients expected more relief on this day (mean 12.63) than they obtained (mean 10.38). The range of these expectations was large as table 29 showed.

Table 29 - RANGE OF PATIENTS' EXPECTATIONS OF PAIN RELIEF ON THE FIRST DAY AFTER SURGERY

PAIN RELIEF SCORE		PAIN RELIEF DESCRIPTION	n
0	-	PAIN NO BETTER	1
5	-	PAIN SLIGHTLY BETTER	12
7			1
8			1
10	-	PAIN QUITE A LOT BETTER	16
15	-	PAIN VERY MUCH BETTER	8
18			1
20	-	PAIN COMPLETELY BETTER	18
88	-	DON'T KNOW	22
		TOTAL	80

Comments on table 29: several patients remarked they thought modern drugs could completely stop the pain, and table 29 showed the range of their expectations. This illustrated that patients held widely differing expectations about the analgesic effects of painkillers. That thirteen patients felt painkillers would make their pain only slightly better or less was of concern. If these patients had pain after surgery, these expectations may have engendered feelings of helplessness in terms of pain control. Expectations of pain relief could, of course, be revised if any painkillers subsequently administered were effective, but at least initially it seemed likely that these patients would have felt there was little that could be done

to relieve their pain. Similarly, some of the twenty-two patients who did not know how effective a painkiller would be might be expected to experience similar feelings. The work of Pennebaker et al(1977) suggests a lack of perceived control may increase the reporting of physical symptoms.

Although eighteen patients expected painkillers to make their pain completely better, this was the goal of pain relief for nine nurses, as table 82 illustrated.

4.6.4 Recovery

This was assessed using a recovery inventory and the patients own recovery rating, as explained in the methods section. The scores ranged from 0 to 100, low scores representing poor, and high scores good recovery. Figure 14 illustrated the results, which are presented in tables 30 and 31.

Table 30 - RECOVERY INVENTORY SCORES

DAY	MEAN	STANDARD DEVIATION	n
PRE	94.62	7.82	80
1	19.45	13.41	80
2	31.53	17.50	80
3	44.90	20.39	77
4	52.50	20.22	76
5	61.55	20.33	76
6	69.56	19.35	76
7	73.94	17.91	72

Patients' self ratings of recovery showed the same trend, although they were less extreme than recovery inventory scores, as table 31 illustrated.

Table 31 - SELF RATINGS OF RECOVERY

DAY	MEAN	STANDARD DEVIATION	n
PRE	80.74	20.70	74
1	42.70	22.88	37
2	46.32	20.55	56
3	51.60	22.00	58
4	52.70	23.23	54
5	59.39	19.56	53
6	61.25	20.54	52
7	61.69	22.42	52

Comments on tables 30 and 31: Not unexpectedly, scores decreased from preoperative to first day postoperative assessments, then gradually returned towards, but did not reach, preoperative levels. The wide dispersion of

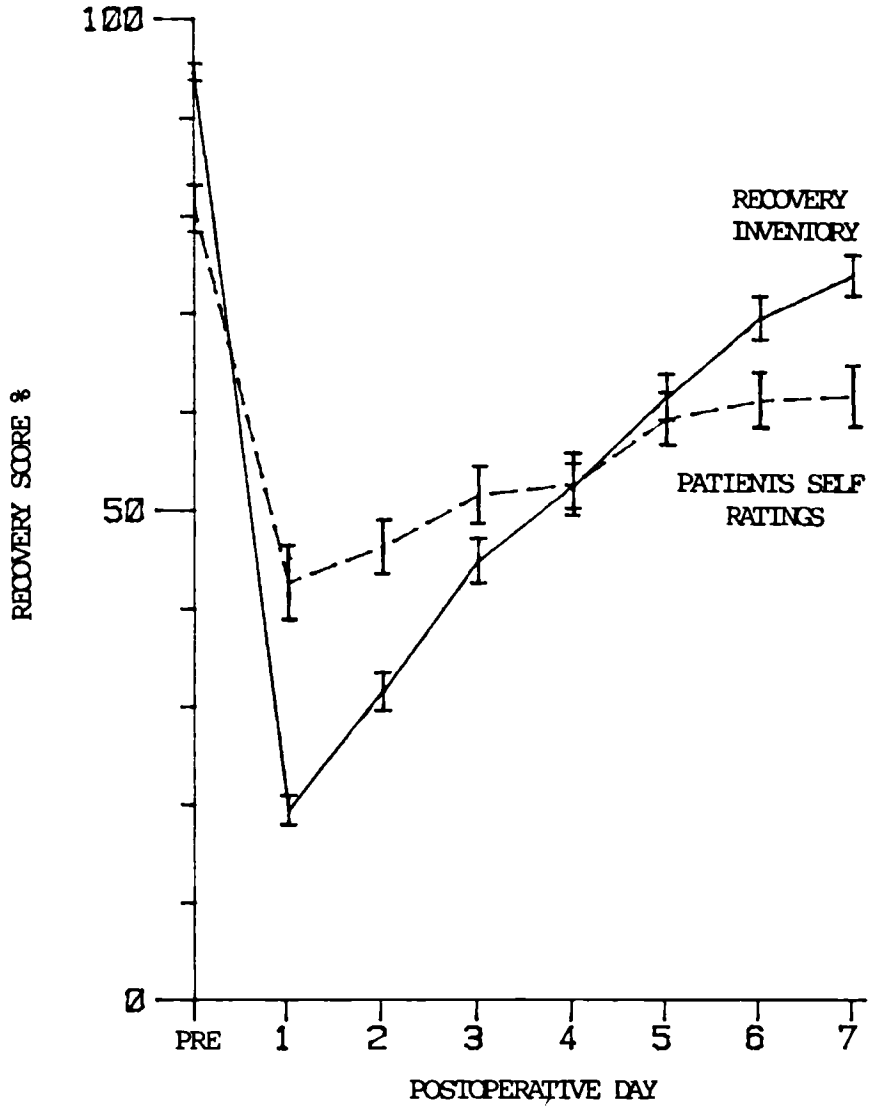

FIGURE 14. Patients Mean Ratings of Recovery.

This graph illustrates the patients mean recovery inventory scores and self ratings of recovery, with standard error bars (I) preoperatively (PRE) and once a day during the first seven postoperative days. A higher percentage score represents a better recovery.

inventory and self rating scores illustrated the variation between patients. Both recovery scores, although following the same trend, were slightly different. The recovery inventory scores were more extreme than the recovery self ratings. One reason for this could have been the nature of the inventory items. For example, taking 30ml or 60ml of water may not have been important to the patient, whereas they did each form 1/22 of the recovery inventory score. These items may have assumed more importance if the doctor conveyed to the patient it represented progress, although achieving the item in itself may not have made the patient feel any better. This raised an important issue about the weighting of recovery inventory items. Using an inventory such as this one assumes, by the scoring method if nothing else, that each item will contribute equally to the score. Shapiro(1975) also queried the extent to which multiple questions assumed that the contribution of each item to a common variable was the same. For example, the presence or absence of fatigue, or a good nights sleep may have had far more influence on how a patient felt than whether they could walk to the end of the bed. Whilst walking may have been seen as important progress, its effect may not have been equally weighted, or equally important to the patient. Also the nature of the scoring on the inventory, converting a score out of 22 to a percentage may have artifically reduced or augmented the scores (although consistenly so for all patients), making them more extreme. Inventory scores may have been lower immediately after surgery as there was, to some extent, an 'enforced' lower score - the patient was not allowed to drink/eat. The recovery self ratings may have been less extreme because they were not artifically reduced or augmented, did not require the assumption of equal weighting but reflected what the patient felt, rather than the number of items they had achieved on the inventory. In addition, the patient may have felt relieved at being alive immediately after surgery, and may have initially 'over-rated' their own recovery. This inital over-rating was partly supported by later scores staying low and not increasing as rapidly as the

recovery inventory scores. This also lent support to the argument that different items on the recovery inventory had different weightings: the types of items which took longer to return to normal on the inventory may have represented factors which kept the patients own rating of recovery lower on the later postoperative days. The inventory could be considered an 'objective' indicator (although including several subjective items) and self ratings as a more 'subjective' indicator of recovery. It is possible that self ratings of recovery were more akin to Wolfer's(1973) concept of welfare, "...the complex, multidimensional, and changing affective and cognitive state of an individual..." p396, rather than recovery which he viewed more in terms of physiological and anatomical functioning. However, the extent to which physiological and psychological aspects of recovery can or should be separated is debatable as together they comprise recovery.

4.6.5 THE RELATIONSHIP BETWEEN PAIN, PAIN RELIEF AND RECOVERY

The presentation of these results is divided into those derived from mean scores, and those derived from raw scores, with an emphasis on the latter, because of the large inter-individual variations.

Mean Scores

Pain and pain relief each had 14 postoperative ratings, and so were directly compared. When they were compared to recovery ratings, which had seven postoperative ratings, mean daily ratings were used so comparisons could be direct. Spearman rank correlation coefficients were used to look at relationships between these variables.

Pain and Recovery Inventory Mean Scores

Pain scores were negatively correlated with recovery inventory scores, $r_s = -0.964$ $p<0.01$.

Pain and Self Ratings of Recovery Mean Scores

There was also a negative correlation between pain and self ratings of recovery. $r_s = -0.964$ $p<0.01$

Thus increased pain was correlated with a reduced recovery score on both types of recovery assessment. The higher the patient rated their pain, the lower their recovery score.

Comments: these results illustrated overall trends. Relationships using raw scores were felt to be more useful.

Pain Relief and Recovery Inventory Mean Scores

Pain relief scores were negatively correlated with recovery inventory

scores. r_s=-0.857 $p<0.05$

Pain Relief and Self Ratings of Recovery Mean Scores

Pain relief scores were also negatively correlated with self ratings of recovery. r_s=-0.857 $p<0.05$

Thus the better the patient's pain relief, the worse their recovery score. Or, the worse pain relief they had, the higher their recovery score. Comments: this apparently inconsistent finding may reflect that patients got better despite poor pain relief, or they obtained better pain relief when they were less well recovered, and as they became better pain relief was less successful. Table 98 tended to support this later interpretation: the percentage of patients for whom painkillers made the pain very much better decreased with time. An alternative explanation could be the more painkillers and pain relief patients received, the more extensive the operation and thus the more slowly they recovered overall. Looking at this from another angle, the less pain relief patients obtained, the better they recovered. This may suggest painkillers were in some way hindering the patients recovery. Taking painkillers may have made the patient feel less well recovered psychologically as well as through side effects such as drowsiness and gastric irritation. The relationship between painkillers and recovery is presented more fully on pages 246-248.

Using Raw Scores

Correlations were computed on a day:day basis, as were other permutations, in case any lag relationship operated between the variables. Kendall's Tau was used to assess any relationship.

Lag Relationships

Before lag or delayed relationships are considered, some caution is necessary over their interpretation. It could be argued that these apparent lag relationships occurred purely because ratings on days close to each other were fairly similar, and thus were likely to be correlated in this way.

It was felt, however, that these lag relationships, especially when prolonged, at times illuminated the results in an interesting way, and thus were included in the text with the proviso that they should be interpreted rather cautiously.

When correlations between raw scores were investigated on a day to day basis, a more complex relationship emerged than was apparent from the mean scores. This was to be expected given the large dispersion of scores.

a) Pain and Pain Relief

The relationship between pain and pain relief was examined.

Table 32 - THE RELATIONSHIP BETWEEN PAIN AND PAIN RELIEF

DAY	KENDALLS TAU	n	SIGNIFICANCE	
1am	-0.20	57	$p<0.05$	
1pm	-0.24	35	$p<0.05$	
2am	-0.41	51	$p<0.001$	
2pm	-0.35	31	$p<0.01$	
3am	-0.06	42	$p>0.05$	NS
3pm	-0.40	27	$p<0.01$	
4am	-0.29	30	$p<0.01$	
4pm	-0.41	24	$p<0.01$	
5am	-0.03	32	$p>0.05$	NS
5pm	-0.22	22	$p>0.05$	NS
6am	-0.50	27	$p<0.001$	
6pm	-0.62	17	$p<0.001$	
7am	-0.32	24	$p<0.05$	
7pm	-0.25	12	$p>0.05$	NS

Comment on table 32: the relationship predicted between pain and pain relief was that the more pain relief obtained, the less pain experienced.

Conversely, the more pain experienced, the less relief obtained. The results substantially supported this relationship.

b) Pain and Recovery Inventory Scores

i) Preoperative

Table 33 - THE RELATIONSHIP BETWEEN PREOPERATIVE RECOVERY INVENTORY SCORES AND PRE AND POSTOPERATIVE RATINGS OF PAIN

DAY	KENDALLS TAU	n	SIGNIFICANCE	
PRE	-0.14	78	p>0.05	NS
1	+0.03	66	p>0.05	NS
2	-0.06	71	p>0.05	NS
3	-0.28	69	p<0.01	
4	-0.31	69	p<0.001	
5	-0.10	69	p>0.05	NS
6	-0.21	64	p<0.02	
7	-0.12	68	p>0.05	NS

This table indicated there was a negative correlation between the preoperative recovery inventory scores and postoperative pain scores on days 3,4 and 6 after surgery. So the lower the patients recovery inventory before surgery, the more pain they had on these days.

ii) Postoperative

All other correlations between postoperative recovery inventory scores and postoperative pain scores were not significant, nor was there any lag relationship in either direction.

Comments on table 33: The reasons for this relationship are unclear, especially since there was very little variation in recovery inventory scores before surgery. It could be argued that if the patient was less well before surgery, they were more likely to have needed an extensive operation and thus had more pain. Although mean scores revealed a significant

difference between diagnosis and pain, raw scores showed no such significant effect on pain, so this explanation was unlikely. Preoperative recovery inventory scores did not correlate with pain scores on the first two days after surgery. One explanation for this could be that there were many factors other than preoperative recovery scores which may have affected pain during these days.

After surgery, the lack of any significant correlations between postoperative pain and recovery was a slightly unexpected finding. This finding however was not substantiated by the results from patients own ratings of recovery, or by Wolfer & Davis(1970) who used a recovery inventory. They found recovery inventory scores were correlated with the amount of pain and its intensity for males, and the amount of pain only for females, on the first postoperative assessment, and with the amount of pain and its intensity in both sexes on the second postoperative assessment. The likely causes of these differences betweeen inventory score and self rating correlations will be discussed after the next section on these self ratings.

c) Pain and Self Ratings of Recovery

i) Preoperative

Preoperative self ratings of recovery negatively correlated with pain scores on the first day after surgery. $r_s = -0.16$ $n=62$ $p<0.05$. The less fit patients felt before surgery, the more pain they had on the first postoperative day. There were no significant correlations on other days.

ii) Postoperative

Table 34 - THE RELATIONSHIP BETWEEN POSTOPERATIVE SELF RATINGS OF RECOVERY AND PAIN

PAIN (DAY)	RECOVERY SELF RATINGS (DAY)	KENDALLS TAU	n	SIGNIFICANCE
1	1	-0.11	37	p>0.05 NS
2	2	-0.20	55	p<0.02
3	3	-0.25	54	p<0.01
4	4	-0.27	51	p<0.01
5	5	-0.12	51	p>0.05 NS
6	6	-0.02	50	p>0.05 NS
7	7	-0.13	49	p>0.05 NS

This table showed the more pain patients had on days 2,3 and 4 after surgery, the less well recovered they felt.

Comment on table 34: the reason for a lack of significant correlation between pain and self ratings of recovery on the first postoperative day may have been partly because so many factors other than pain affected how fit patients felt, for example, the anaesthetic. Pain on days 5-7 was not related to self ratings of recovery. It was possible that recovery progressed faster than pain declined, and recovery perhaps became more independent of pain and self perpetuating: as patients achieved other goals such as self care and mobilisation, this made them feel better rather than a lack of pain, and this progress had more effect on how recovered they felt.

There was also a lag relationship, with pain on one day related to recovery self ratings on later postoperative days, as table 35 illustrated.

Table 35 - THE LAG RELATIONSHIP BETWEEN PAIN AND SELF RATINGS OF RECOVERY

PAIN (DAY)	RECOVERY SELF RATINGS (DAY)	KENDALLS TAU	n	SIGNIFICANCE
1	2	-0.18	48	$p<0.05$
1	4	-0.23	45	$p<0.02$
2	3	-0.23	56	$p<0.01$
2	4	-0.22	52	$p<0.01$
3	4	-0.30	49	$p<0.01$
3	5	-0.18	49	$p<0.05$
3	6	-0.19	48	$p<0.05$
3	7	-0.31	48	$p<0.01$
4	7	-0.23	47	$p<0.01$
5	7	-0.23	50	$p<0.01$
6	7	-0.23	48	$p<0.01$

Although some of these correlations were quite low, for example, -0.18, they were statistically significant. All other correlations were not significant.

Also, recovery self ratings on day 2 were related to pain scores on day three, $\tau = -0.25$ $n=50$ $p<0.01$. The less well recovered patients felt on day 2, the more pain they had the following day. Other correlations between recovery self ratings and pain were not significant.

Comments on table 35: pain on one day could affect recovery self ratings on subsequent days. Pain on day 3 was found to be particularly influential: the higher patients rated their pain on this day, the less well recovered they felt for the next four days. This could have been linked with a reduction in narcotic painkillers at this time. The change to non-narcotics when pain may still have been severe could have shaken and tired the patient, thus reducing subsequent self ratings of recovery. Lag relationships in the other direction, with recovery ratings one day affecting pain the next were at best weak.

What were the likely causes of differences between pain and recovery self rating correlations and pain and recovery inventory correlations? It could have been due to a weakness in one or other of the tools, or that

they were not measuring the same process. Patients own ratings of recovery could be influenced more by pain than were the recovery inventory items. For example, whilst pain may not have made blood pressure and pulse unstable, or affected the patient's ability to take 30 or 60 ml of water an hour, the extent to which the other items were influenced was debatable. Arguably, 15 of the 22 items would not be directly affected by pain, whilst 6 of the 22 (appetite, sleeping, concentration, lack of fatigue, lack of anxiety and interest in surroundings) may have been affected. The final item, being pain free, was, of course, directly affected by pain. Thus the majority of items may not have been directly influenced by pain. This again emphasised the importance of weighting the recovery inventory items. The influence pain had on patients ratings of overall fitness may thus have been greater than its influence on recovery inventory items.

The situation emerged where objective indicators seemed to be less affected by pain than were the patients subjective feelings of recovery. This raised the question whether recovery was considered only in terms of 'objective' progress by the health professionals, or whether the patient's own perceptions of their progress were taken into account. It seemed likely that although the recovery inventory and recovery self rating scores were similar, they may not have been assessing the same process.

Before the relationship between pain relief and recovery is examined, the effect accuracy of expectations of pain had on the major variables will be presented.

d) Accuracy of Expectations of Pain

Whether pain expected was different from pain experienced, and whether this difference had any effect on any of the major variables was also examined. Initially, in the pilot study, patients had been asked how much pain they expected on each of the first seven days after surgery. However, they had found this difficult to answer, and in the main study were only asked

how much pain they expected on the first day after surgery. The effect of these differences was to be examined from two different perspectives. First, that of Johnston(1986), who maintained emotional distress was associated with having more pain than expected, whether the patient estimated a low or high amount. This contrasted with the second perspective of Johnson(1973) who asserted that predictability was the main determination of distress. Thus whereas Johnson's perspective would suggest a mildly inaccurate underestimation of pain was preferable to a large overestimation, Johnston's approach would support the opposite argument.

Analysis based on the first perspective revealed that if pain on day one was more than expected, these patients had more pain on the second postoperative morning, $U=95.0$ $p<0.02$, and they obtained less relief from painkillers at this time, $U=38.0$ $p<0.02$. They were also more anxious on day 6 $U=32$ $p<0.05$, compared to patients who experienced equal or less pain than they expected. There was no effect on either measure of recovery, and having more pain was not affected by any preoperative measure of pain, pain relief, anxiety or recovery.

Analysis to test the second perspective of whether accurate predicitions of pain affected major outcome variables was not be undertaken as only five patients had the same score for expected and actual pain on the first day after surgery.

Comment: considering the incongruence between patients expectations of pain and that experienced, the effect this accuaracy of expectations had on the major outcome variables was investigated. The results gave very weak support to Johnston's(1986) argument that having more pain than expected would increase emotional distress. This happened, in the form of increased anxiety, but not until the sixth postoperative day. More interestingly, having more pain than expected on the first day after surgery resulted in more pain and less pain relief on the second postoperative morning. Whether this was due to inaccurate expectations, or whether patients had more pain and this

level persisted into the second day, was unclear. However, if this result was merely one of continuing high pain levels, the relationship might have been expected to persist for longer. It thus seemed that experiencing more pain than expected, although not apparently increasing immediate anxiety, may have increased pain and reduced pain relief.

The relationship between pain relief and recovery will now be considered.

e) Pain Relief and Recovery Inventory

There was no significant correlation between pain relief and the recovery inventory the same day on any day, or any significant lag effect.

f) Pain Relief and Recovery Self Ratings

The number of responses on which these correlations were based was very low and their significance should thus be interpreted with caution. The reason for these low numbers was mainly that fewer patients were taking painkillers on the later postoperative days. Also, because a mean score per day was used, if one of the two ratings of pain relief was missing, the whole day was excluded.

Table 36 - THE RELATIONSHIP BETWEEN PAIN RELIEF AND SELF RATINGS OF RECOVERY

PAIN RELIEF (DAY)	RECOVERY SELF RATINGS (DAY)	KENDALLS TAU	n	SIGNIFICANCE
4	4	+0.52	10	$p<0.02$
6	6	+0.52	9	$p<0.05$
2	3	+0.28	20	$p<0.05$
3	4	+0.37	16	$p<0.05$
3	5	+0.66	13	$p<0.01$
3	7	+0.44	14	$p<0.01$
4	5	+0.57	10	$p<0.05$
5	6	+0.61	7	$p<0.05$
6	7	+0.69	8	$p<0.01$

This table showed that there was a consistent lag relationship. The more pain relief patients obtained on days 2 to 6, the higher they rated their own recovery the following day. Conversely, the less pain relief they obtained over these days, the lower they rated their recovery the following day. Pain relief on the third postoperative day was particularly influential for several days. All other correlations were not significant.

Comments on table 36: the lag relationship appeared to be more consistent than day to day relationships. This suggested that analgesics may have had a cumulative effect, or that getting good pain relief one day made the patient more relaxed and confident the next, hence they felt better. Alternatively, poor pain relief one day could lead to a less relaxed patient, possibly worried about more pain, who thus felt less well. Despite the low numbers, it seemed better pain relief enhanced patients perceptions of recovery.

g) Morning and Afternoon Pain Scores

To conclude this section, the relationship between morning and afternoon pain and pain relief scores will be examined using a Wilcoxon signed rank test. The only significant difference between morning and afternoon ratings of pain was on day 7, $z=-0.21$ $p<0.05$. There were no significant differences between morning and afternoon ratings of pain relief on any day. Comments: it was possibly these differences on day 7 resulted from the patients, knowing it was the last interview, 'faking good'. These findings suggested, statistically at least, that a twice daily assessment of pain and its relief was not necessary. However, despite this, when considering individual patients, it was felt a twice daily rating had been clincially useful in building up a picture of the patients experiences.

4.6.6 ANXIETY

This section examines the results of an analysis of the second aim, which was to determine whether anxiety affects pain, pain relief and/or recovery. To follow a similar structure to that used in the previous section, anxiety scores will be considered first, then their relationship to the other variables will be examined.

Table 37 - PRE AND POSTOPERATIVE ANXIETY SCORES

TYPE OF ANXIETY SCORE	DAY	MEAN SCORE	STANDARD DEVIATION	n
Trait	PREOP.	35.44	9.52	65
State	PREOP.	39.08	12.68	68
State	1	40.72	11.91	29
State	2	38.46	10.27	43
State	3	38.24	12.55	54
State	4	37.20	12.45	43
State	5	36.47	12.49	48
State	6	33.36	11.30	47
State	7	32.56	11.76	44

The data in table 37 are presented graphically in figure 15.

Preoperatively, three patients refused to complete the inventory, poor understanding of English precluded a further three, six were too ill and three refused to complete the trait scale having completed the state scale. Postoperatively, three more refused to complete the scales, (thus nine patients in total refused to complete the inventory). The rest of the missing data comprised patients who in the researchers judgement were too ill to be asked to complete it, or were asleep, or were drowsy and thus unable to concentrate.

These findings showed anxiety state increased after surgery, then gradually declined over the postoperative period. Again there was a consistently large standard deviation.

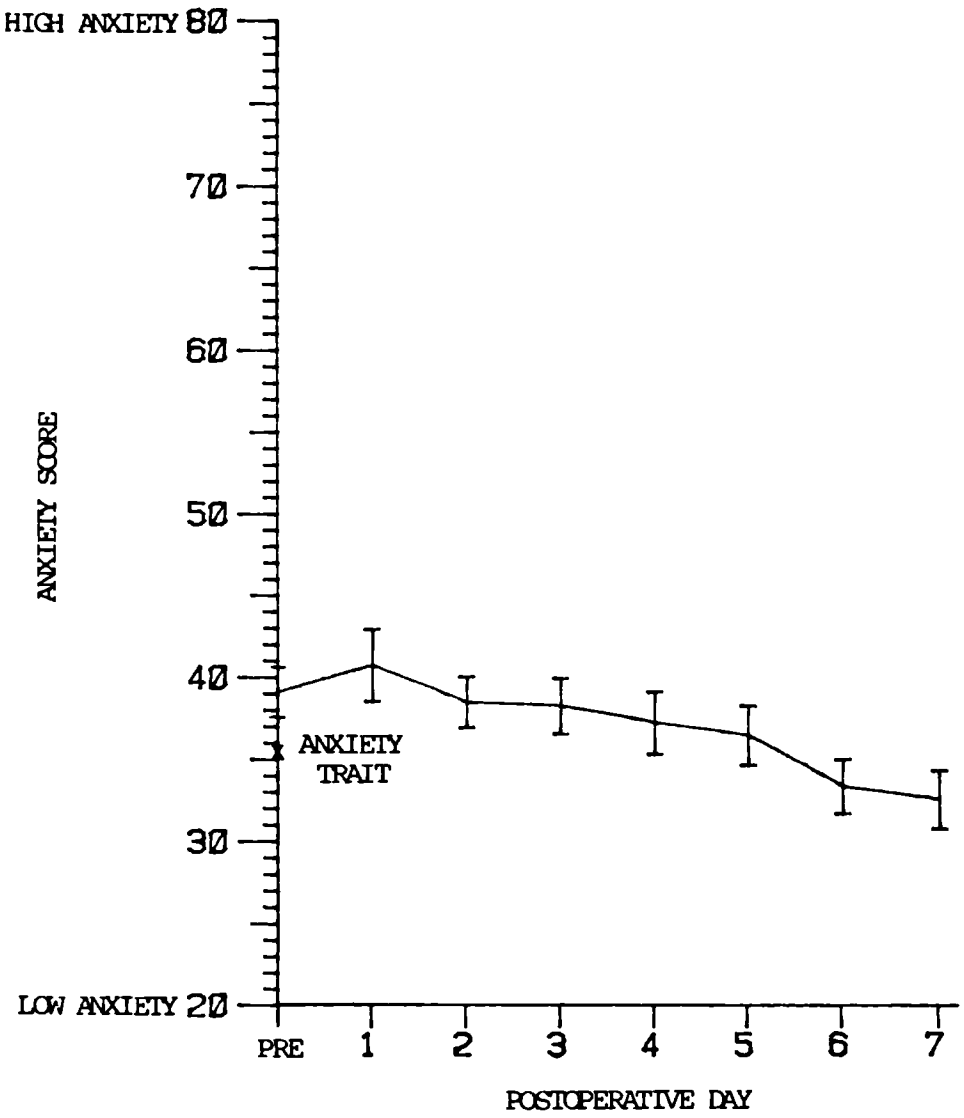

FIGURE 15. Patients Mean Ratings of Anxiety.

This graph illustrates the patients mean anxiety state score, with standard error bars (I), preoperatively (PRE) then once a day for the first seven postoperative days. Scores range from 20 (low anxiety) to 80 (high anxiety). The preoperative anxiety trait score is also shown.

Comments on these results will be divided into those about anxiety trait scores, anxiety state scores and trajectories of anxiety state scores after surgery.

a) Anxiety Trait

Comments on Anxiety Trait Scores: the scores obtained in the present study were compared to those reported in the State-Trait Anxiety Inventory(STAI) manual, Spielberger et al(1983), and by Knight et al(1983). The present study results reported an overall mean for anxiety trait of 35.44 for both sexes. The STAI manual, which used a sample of working adults, listed an overall mean for anxiety trait of 34.84 for both sexes. Knight et al(1983), again used a sample from the general population, found an overall mean for both sexes of 34.98. Thus the present study findings indicated the patients in the sample were not unlike those working adults in Spielberger et al(1983) study, or those members of the general population who comprised the sample in Knight et al's (1983) study.

However, when results were considered by sex, slighly different results emerged. Spielberger et al found anxiety trait means were similar between the sexes at 34.89 for males and 34.79 for females. Knight et al reported larger differences with a mean score of 33.1 for males and 36.85 for females. The present study findings were even more diverse than those of Knight et al, at 32.32 for male and 38.29 for female patients. The extent to which this difference was due to men denying anxiety to a female interviewer is uncertain. However, the present study supported the difference between sexes found by Knight et al.

b) Anxiety State

Comments on Anxiety State Scores: it would not have been appropriate to compare normal anxiety state values in working adults or adults in the general population with those of patients in hospital, who might reasonably be

expected to have increased levels of anxiety state compared to normal, except to illustrate this increase. This increase was indeed confirmed with mean anxiety state values for both sexes being 35.46 and 31.85 in the Spielberger et al and Knight et al studies respectively, compared to preoperative levels in the present study of 39.08. This confirmed that being in hospital before surgery was more stressful than usual, every day situations. On later postoperative days, anxiety state scores were more similar to those of Spielberger et al and Knight et al, indicating perhaps the later postoperative days were more reflective of 'usual' state anxiety levels. Infact, in the present study, anxiety state scores on days six and seven did fall below those mean scores reported by Spielberger et al, although not below those reported by Knight et al. This could be interpreted as once the patients were recovering, and the threat of surgery was over, the hospital environment was less stressful than the usual 'outside' world. However, Knight et al's mean anxiety state score of 31.85, and that of Johnston(1980) at 35 days after surgery, (study 3), of between 31 and 32 (as taken from the graph) were not substantially different from the present study mean on day 7 of 32.56. This suggested that if the later postoperative days were not less stressful than usual 'outside' life, they were not substantially more stressful.

c) Trajectories of Anxiety State

Comments on Trajectories of Anxiety State Scores: the pattern of anxiety state scores over the postoperative period showed an increase compared to preoperative levels on the first day after surgery, then a gradual decrease over time. These findings partly supported those of Chapman & Cox(1977). They also used the STAI to assess anxiety after general abdominal surgery. Anxiety scores before surgery and on days 1 and 3 after surgery only were reported. Their preoperative anxiety state score was very similar to the present study value of 39.08 at 39.93, as was the first postoperative day with

a mean of 40.72 in the present study compared to the 41.02 reported by Chapman & Cox. Scores were less similar by the third postoperative day, with the present study score of 38.24, compared to the Chapman & Cox score of 40.61.

Despite the similarities with part of Chapman & Cox's(1977) findings, they reported a rise in anxiety state levels after surgery which was sustained until at least the third postoperative day. Whilst the present study also found an increase between pre and postoperative scores, this increase was not sustained over the same period of time, although the preoperative mean score and those of the second and third postoperative days were within 1.0 of each other. Also, Chapman & Cox had a sample of 22 males and 45 females. When scores of the present study were divided by sex, (see Table 65), then male patients showed an increase in anxiety state on the first postoperative day, which then declined. However, with the female sample, anxiety state was elevated above preoperative levels on the first two days after surgery, and stayed within 1.0 of preoperative levels on days three and four. Thus high anxiety scores were more sustained for female patients. Given the unbalanced distribution of sex in Chapman & Cox's study, their findings were very similar to those of the present study. This sex difference was supported by the findings of Auerbach(1973) who studied an all male sample. He reported scores of 41.1 preoperatively, of 38.6 at 48 hours after surgery and of 34.1 at six days after the operation. Anxiety was also lower than preoperative levels by the second postoperative day in male patients in the present study.

Mixed and single sex samples were used by Johnston(1980) who also used the STAI to assess anxiety in surgical patients. She reported the findings of three investigations which were relevant to the present study. The first study of 11 female and 9 male orthopaedic surgery patients found, using analysis of variance, no significant change in anxiety scores over days, although anxiety increased after surgery and stayed high for at least five days. The second study consisted of 21 female patients undergoing elective

major gynaecological surgery. Anxiety state was slightly higher the day after than the day before surgery. It then declined to below preoperative levels. This was supported by the findings of the present study. The highest value in this second study was reached two days before surgery, usually also the day before admission. The third study was considered more representative as it involved 72 patients undergoing major elective gynaecological surgery. The results illustrated scores were higher before than after surgery, although scores the day before surgery were not significantly different to those on the second day, this difference only became significant on the sixth day after surgery. The data from the third study were presented in graph form, so exact values were unknown, but preoperative scores were very similar to those on the second postoperative day then gradually declined over the first week. These results, although obtained only from female patients, supported the present study results in suggesting high levels of state anxiety can be reached after surgery.

The findings of other studies appeared not to have supported high anxiety state after surgery. For example, Martinez-Urrutia(1975) found preoperative anxiety state scores were higher than those obtained after surgery. However, postoperative ratings were made on the tenth postoperative day, by which time they might have reasonably been expected to decline below preoperative levels. Also, before the postoperative assessment, patients had been told by the doctor that they were recovering well without complications. This assurance in itself was likely to decrease anxiety. Similarly, Spielberger et al(1973) found anxiety state scores were higher before than after surgery. However, postoperative ratings were made 3-9 days after surgery, with a median of 7 days, which provided time for anxiety levels to subside.

All studies discussed so far have used the STAI to assess anxiety. Wolfer & Davis(1970) assessed anxiety somewhat differently. A 'Moods and Feelings Inventory' developed by these authors was used to assess transient

'fear-anxiety'. This revealed 'fear-anxiety' was highest before surgery and then declined. However, the day on which the first postoperative test was administered was variable, with 24% of females and 28% of males not being ready to take the first test until the third or fourth postoperative day. The second postoperative test was conducted the day after the first test. These results were thus obtained over a variable time period.

Many of the seemingly conflicting findings have been explained by the differing times of data collection and the sex of the samples. The present study findings concerning anxiety do not conflict with those of other studies, but supported Johnston's(1980) statement that there was no simple reduction in anxiety from before to after surgery. This support was even more marked for female patients.

d) Patients Feelings About Coming into Hospital for an Operation

The highest variation of anxiety scores occurred preoperatively on the anxiety state scale. This variety was further illuminated by the wide range of feelings patients had about coming into hospital for an operation, and the specific worries they expressed, as tables 38 and 39 showed.

Table 38 - FEELINGS ABOUT COMING INTO HOSPITAL FOR AN OPERATION

RESPONSES	%
Nervous/Apprehensive	32.5
Don't Mind	21.3
No Alternative/Resigned	13.8
Glad	11.2
Hate The Idea	11.2
Other or more than one response	10.0
TOTAL	100.0

This illustrated a range of reactions to hospitalisation, from 'glad' to 'hate the idea'. Patients were also asked 'Is there anything in particular that worries you?' Their responses are presented in table 39.

Table 39 - PATIENTS' PARTICULAR WORRIES

RESPONSES	%
No Specific Worries	26.3
Relatives (effect of admission on them)	15.0
Anaesthetic	7.5
The Unknown	7.5
The Actual Operation	6.3
The Whole Thing	5.0
Other*	32.4

* Other - Included responses comprising less than 5% and included pain, human error, findings of the operation, the operation would not work, other, or more than one worry.

Comments on tables 38 and 39: the feelings of some patients opposed those of other patients. The effect on major outcome variables of, for example, being glad or hating the idea of an operation, would be an interesting area for further analysis. Linked with the fairly high preoperative anxiety state levels, was the finding that nearly one-third of patients said they felt nervous or apprehensive about their operation.

Specific worries presented in table 39 fell into three very broad categories. These consisted of 1) denial of any specific worry, 2) specific worries such as the anaesthetic or the effect of the operation on relatives, and 3) free floating anxiety such as 'the unknown' or 'the whole thing'. Each patient may have required different forms of explanation and reassurance from the nurse, the details of which were outside the scope of the present study. However, the effects of these different worries on outcome variables were another potential area where further analysis could be undertaken. Some of the worries tended to be self-orientated, such as those over the anaesthetic or operation, whilst some were very much more orientated towards others or external events, such as the effect of the operation on relatives. It would be interesting to examine whether this 'internal' or 'external' focus on worries affected any of the major outcome variables. The proportion of

patients with very individual or multiple worries which could not be rigidly categorised was high. This again emphasised the need for individual assessment.

e) Proximity of Preoperative Anxiety Assessment to Day of Surgery

Patients were interviewed on the day of admission, which was not always the day before surgery. It could be argued anxiety state scores, which were lower pre than immediately postoperatively, may have been higher preoperatively, if the test had been administered on the day before surgery. Table 40 showed the results of an investigation into these effects.

Table 40 - PROXIMITY OF PREOPERATIVE ANXIETY ASSESSMENT TO DAY OF SURGERY: RELATIONSHIP TO SCORES OBTAINED

DAY OF PREOPERATIVE ANXIETY STATE TEST	MEAN SCORE	n	STANDARD DEVIATION
Day Before Operation	40.38	26	11.26
Not Day Before Operation	38.28	42	13.56

A Mann-Whitney U test revealed no significant difference between these two groups of preoperative anxiety state scores, $U = 467.0$ $p > 0.05$

f) 'Lack of Anxiety' Item on the Recovery Inventory

When the difference between each patient's anxiety trait and anxiety state scores had been computed for all patients, the top 10%, representing 'high' anxiety, were scores of anxiety state which were +15 or more than that patient's anxiety trait score. Thus any elevation of anxiety state of less than 15 was recorded as 'lack of anxiety' for the purposes of the recovery inventory.

4.6.7 RELATIONSHIPS BETWEEN ANXIETY, PAIN, PAIN RELIEF AND RECOVERY

Mean Scores

Because of differences between male and female anxiety mean scores, (see table 65), their effect on the major variables was divided by sex. However, this did not reveal any new patterns or illuminate any areas, so analysis was undertaken combining both sexes.

Anxiety and Pain

Postoperative anxiety state scores correlated with ratings of postoperative pain, $r_s = +0.965$ $p<0.001$. The higher patients rated their pain after surgery, the higher their anxiety scores. Conversely, the higher their anxiety scores, the higher they rated their pain.

Anxiety and Pain Relief

Postoperative anxiety state scores correlated with ratings of postoperative pain relief. $r_s = +0.86$ $p<0.05$. The more anxious the patient, the better their pain relief. Conversely, the better their pain relief, the more anxious they were.

Comments: the unexpected direction of this relationship had already been found between pain relief and recovery. The arguments to explain the findings were likely to be similar. High anxiety may have occurred despite better pain relief, or as patients became less anxious over time, their pain relief was also, independently, less successful. It was hoped this effect of time on trends would be clarified when daily raw scores were used.

Anxiety and Recovery

Postoperative anxiety state correlated with both recovery ratings.

Anxiety state and recovery inventory, $r_s = -1$ $p<0.001$

Anxiety state and recovery self ratings, $r_s = -1$ $p<0.001$

The less anxious patients were, the higher their recovery scores, or the higher their recovery scores, the less anxious they were.

Raw Scores

These results were divided into influences of trait or usual anxiety and those of state or situational anxiety.

a) Trait Anxiety and its Relationship with the Major Variables

Trait anxiety exerted minimal effects on most of the major variables. There was no significant effect on any ratings of pain, pain relief or recovery inventory scores. It was related to recovery self ratings on the third postoperative day, $r_s = +0.17$ $n=54$ $p<0.05$. So the higher the anxiety trait scores, the higher were self ratings of recovery on day 3. Anxiety trait also affected the number of painkillers taken on day 3, $r_s = +0.17$ $n=65$ $p<0.05$. The higher the anxiety trait scores, the more painkillers were taken on this day.

When anxiety trait was divided, via a median split, into high and low levels and these correlations were repeated for low and high anxiety groups, all were non-significant.

When state anxiety was investigated, anxiety trait correlated with all pre and postoperative measures as table 41 showed.

Table 41 - THE RELATIONSHIP BETWEEN ANXIETY TRAIT AND ANXIETY STATE SCORES

DAY	KENDALLS TAU	n	SIGNIFICANCE
Pre	+0.21	65	p<0.01
1	+0.26	29	p<0.02
2	+0.36	43	p<0.001
3	+0.32	54	p<0.001
4	+0.46	43	p<0.001
5	+0.46	48	p<0.001
6	+0.23	47	p<0.01
7	+0.29	44	p<0.01

Comments: anxiety trait exerted a minimal effect on postoperative variables, apart from anxiety state. This suggested that the anxiety trait score in itself did not influence pain, pain relief or recovery to any great extent. Anxiety trait was related to anxiety state, thus if patients tended to be anxious generally, they were also more likely to be anxious in hospital, both before and after surgery. This confirmed the findings of Wallace(1984) who found anxiety trait was an inconsistent predictor of postoperative outcomes, other than anxiety state. When these findings were compared to other studies, a complex picture emerged, not least because other studies had tended to look at anxiety trait in relation to anxiety state, or in relation to pain, or recovery, but not all three. Sometimes, although these variables were assessed in a particular study, their relationship was not considered.

Johnston(1980) found that whilst anxiety trait prior to admission correlated with state anxiety on the day of admission and day of operation in study 3, in study 4 anxiety trait prior to admission correlated with anxiety state on the morning of admission, but not with anxiety state that afternoon. Johnston concluded anxiety state at this time was not predictable from personality measures and may be more significantly determined by enviromental variables. This conclusion was not supported by the findings of the present study. The relationship between anxiety trait and anxiety state was examined by Martinez-Urrutia(1975). Anxiety trait scores were divided into low and high anxiety using a median split. Those patients with high anxiety trait were found to have higher anxiety state scores both pre and postoperatively. This confirmed the findings of Spielberger et al(1973) and Auerbach(1973), and was supported by the results of the present study. However, when Martinez-Urrutia examined the relationship between anxiety trait and pain, patients with higher anxiety trait scores had higher sensory pain scores (as derived from part of the McGill Pain Questionnaire). This latter

finding appeared to contradict that of the present study, where no such relationship was detected. Martinez-Urrutia indeed concluded that patients with high anxiety trait scores had more pain than patients with low anxiety trait scores. However, when pain intensity scores rather than sensory pain scores were considered, no difference was revealed between patients of high and low anxiety from pre to postoperative assessments. This made these findings rather difficult to interpret. As the present study used a verbal rating scale to assess pain, usually taken to assess pain intensity, these findings actually seemed to support those of the present study.

e) Studies Using Other Measures of Anxiety Trait

Despite using different measures of anxiety trait, most findings were supported by those of the present study. For example, no relationship was found between anxiety trait and state measures of pain by Bruegel(1971). The relationship between anxiety trait and recovery was considered by Wolfer & Davis(1970) who found very little correlation between pre and postoperative measures. They concluded that preoperative emotional state (including anxiety trait assessed using the S-R Inventory of anxiousness), was of little value in predicting postoperative recovery. Their low correlations between anxiety trait and 'fear-anxiety' was not supported by this or other studies. However, neither of Wolfer & Davis'(1970) measures included the STAI and the extent this difference in results was a function of the actual assessment tool was unknown. A study by Johnson et al(1971) used a modified Taylor Manifest Anxiety Scale to assess trait anxiety and found the higher this trait score, the more fear patients had on the first postoperative day. Thus although different measures were used, anxiety trait seemed to be linked to anxiety state, supporting the findings of the present study.

Other studies have assessed usual levels of anxiety (anxiety trait) using the neuroticism scores from the Eysenck Personality Inventory. Neuroticism was found to be linked to pain intensity by Jacox &

Stewart(1973), and to pain intensity in males but not females by Parbrook, Dalrymple et al(1973). However, Cronin et al(1973) did not find this relationship between neuroticism and pain. Thus these findings themselves were contradictory and were difficult to interpret in the light of the present study results.

c) Preoperative Anxiety State and its Relationship with the Major Variables

i) Preoperative Anxiety State and Pain

There was no significant relationship between preoperative anxiety and preoperative pain, however, the more anxious patients were before surgery, the more pain they experienced on the first postoperative day.

lam τ= +0.27 n=67 p<0.01, lpm τ=+0.22 n=58 p<0.01. All correlations for other days were non-significant.

Comments: the lack of a preoperative relationship between preoperative anxiety and pain was supported by the findings of Martinez-Urrutia(1975), who explained this lack of significance by the small amount of variance in preoperative pain levels. This explanation was also appropriate to the findings of the present study. The relationship between preoperative anxiety and postoperative pain seemed to suggest the effect of preoperative anxiety was carried over to influence pain on the first postoperative day. That this effect did not persist was not suprising, as many other variables may have been influential during later days, such as postoperative anxiety levels, which would be likely to override any effect of preoperative anxiety. Both Johnson et al(1971) and Scott et al(1983) found preoperative fear or anxiety was unrelated to the number of analgesic doses taken after surgery. These findings were not in direct conflict with those of the present study as they recorded all analgesics over the postoperative period, whereas significance in

this study was found only on the first postoperative day. Also the extent to which number of analgesics administered reflect pain levels is debatable, as discussed earlier.

ii) Preoperative Anxiety State and Pain Relief

When the same test was applied to pain relief, the more anxious the patient before surgery, the less pain relief they obtained on the first postoperative morning, lam γ = -0.26 n=50 $p<0.01$. Correlations with other days were not significant. The effect of preoperative anxiety on pain and pain relief after surgery was thus of short duration.

Comments: until other factors started to become influential later on the first day, it seemed preoperative anxiety exerted a degree of influence on pain relief. No other studies reviewed had investigated the effect of preoperative anxiety on pain relief.

iii) Preoperative Anxiety State and Recovery

There was no significant relationship with any of the recovery inventory or self ratings of recovery scores on any day.

Comments: this finding did not support the findings of Sime(1976) who found higher levels of preoperative fear resulted in a longer recovery. However, it confirmed those of Wolfer & Davis(1970) who found little correlation between preoperative anxiety state and postoperative recovery, although no correlations or tests of significance were reported. It also confirmed those of Johnson et al(1971) who found preoperative fear was unrelated to length of hospitalisation, used as a measure of recovery.

iv) Preoperative Anxiety and Postoperative Anxiety

Preoperative anxiety did show a relationship with postoperative anxiety, as table 42 showed.

Table 42 - THE RELATIONSHIP BETWEEN PRE AND POSTOPERATIVE ANXIETY

DAY	KENDALLS TAU	n	SIGNIFICANCE	
1	+0.19	29	p<0.08	NS
2	+0.26	43	p<0.01	
3	+0.28	54	p<0.01	
4	+0.26	43	p<0.01	
5	+0.30	48	p<0.01	
6	+0.21	47	p<0.02	
7	+0.30	44	p<0.01	

The more anxious patients were preoperatively, the more anxious they were after surgery, excluding the first postoperative day. Note the low number of responses on this first day.

The importance of any difference between patients preoperative anxiety trait and anxiety state scores was examined. Anxiety trait scores were thus subtracted from preoperative anxiety state scores. However, these differences did not show any correlation with pain, pain relief, postoperative anxiety, recovery inventory scores or recovery self ratings. They were related to preoperative pain: the greater the elevation of anxiety state over anxiety trait preoperatively, the greater the preoperative pain scores, τ =+0.18 n=65 p<0.05.

Comments: that preoperative anxiety was not significantly correlated with anxiety on the first day after surgery may have been because many other variables affected anxiety on this day, which exerted a stronger influence than preoperative anxiety. Also, the numbers of patients who responded to the STAI on the first postoperative day were low, as patients were often too unwell to complete the inventory. This first day's value was only just outside significance on this day, and if more patients had been able to complete the scale on the first day, correlations may well have been significant. These findings supported those of Wolfer & Davis(1970), who found higher preoperative 'fear-anxiety' was related to higher postoperative 'fear-anxiety'. The results of Johnson et al(1971) that high preoperative fear lead to high levels of negative emotion after surgery were also supported

by the present study.

d) Postoperative Anxiety State and its Relationship to the Major Variables

i) Postoperative Anxiety and Pain

Table 43 - THE RELATIONSHIP BETWEEN POSTOPERATIVE PAIN AND ANXIETY

PAIN (DAY)	ANXIETY (DAY)	KENDALLS TAU	n	SIGNIFICANCE
1	1	+0.34	29	$p<0.01$
2	2	+0.32	42	$p<0.01$
3	3	+0.17	50	$p<0.05$
4	4	+0.17	40	$p<0.07$ NS
5	5	+0.18	45	$p<0.05$
6	6	+0.09	44	$p<0.20$ NS
7	7	+0.16	42	$p<0.08$ NS

This showed an increase in anxiety was positively correlated with an increase in pain on days 1,2,3 and 5 after surgery. The more anxious patients were on these days the more pain they had, or the more pain they had, the more anxious they were. Note days 4 and 7 were just outside significance levels.

There was also a lag effect, with anxiety levels one day affecting pain on subsequent days, and with pain levels one day influencing anxiety on subsequent days, as tables 44 and 45 illustrated.

Table 44 - THE LAG RELATIONSHIP BETWEEN ANXIETY AND PAIN

ANXIETY (DAY)	PAIN (DAY)	KENDALLS TAU	n	SIGNIFICANCE
1	2	+0.40	29	$p<0.02$
3	4	+0.21	46	$p<0.02$
3	5	+0.18	47	$p<0.05$

TABLE 45 - THE LAG RELATIONSHIP BETWEEN PAIN AND ANXIETY

PAIN (DAY)	ANXIETY (DAY)	KENDALLS TAU	n	SIGNIFICANCE
1	2	+0.29	36	p<0.01
1	3	+0.26	45	p<0.01
1	4	+0.19	36	p<0.057 NS
1	5	+0.19	39	p<0.054 NS
1	6	+0.27	38	p<0.01
1	7	+0.18	35	p<0.075 NS
2	3	+0.22	53	p<0.02
3	5	+0.20	45	p<0.05

The amount of pain experienced on day one had a marked association with anxiety throughout the postoperative period, reaching statistical significance on days 2,3, and 6 after surgery. All other correlations not shown in this table were non significant.

Comments on tables 43, 44 and 45: pain and anxiety seemed to be most strongly linked for the first three days after surgery. This finding was supported by Chapman & Cox(1977) who found anxiety state was significantly related to pain on the first and third day after surgery. Higher anxiety state scores were linked to higher sensory pain questionnaire scores, although not pain intensity scores, by Martinez-Urrutia(1975) when postoperative assessments were made 10 days after surgery. This suggested the link between postoperative pain and anxiety persisted for longer than the findings of the present study had indicated. Although not specifically discussed, Wolfer & Davis(1970) found postoperative 'fear-anxiety' was positively correlated with the amount and intensity of pain in females and the amount of pain only in males for the first postoperative assessment. The second postoperative assessment, which took place the following day, was again positively correlated with the amount and intensity of pain for females and with the amount of pain only in males. Thus, for the amount of pain in both sexes, the higher the 'fear-anxiety' score, the more pain was reported, and for females only, the greater was its intensity.

The extent to which it was pain that affected anxiety or anxiety that

affected pain, or a circular relationship between the two could only be speculation. Lag relationships appeared to operate in both directions, perhaps supporting a circular relationship. Pain on the first postoperative day had a marked effect on anxiety. This suggested that if patients experienced severe pain on the first postoperative day, they tended to be more anxious throughout their stay. This supported the finding of Chapman & Cox(1977) who also found immediate postoperative pain prolonged anxiety. If pain was more severe it would be understandable that patients, shattered by this experience of pain and feeling vunerable, would be more anxious, wondering if the pain would return. Adequate pain control, especially on the first postoperative day, appeared to have the potential to reduce subsequent anxiety levels.

ii) Postoperative Anxiety and Pain Relief

The numbers here were very low on some days, and thus cannot be considered representative of the sample.

Anxiety on days 1 and 4 correlated with pain relief on those days, day 1 $\tau = -0.43$ $n=13$ $p<0.02$, Day 4 $\tau = -0.78$ $n=7$ $p<0.01$. The less relief these patients had, the more anxious they were. Conversely, the more anxious they were, the less relief they obtained on these days. No other day to day correlations reached significance. However, there was a lag relationship, with pain relief on one day affecting anxiety on subsequent days.

Table 46 - THE LAG RELATIONSHIP BETWEEN PAIN RELIEF AND ANXIETY

PAIN RELIEF (DAY)	ANXIETY (DAY)	KENDALLS TAU	n	SIGNIFICANCE
1	2	-0.37	14	$p<0.05$
1	3	-0.29	21	$p<0.05$
3	5	-0.48	12	$p<0.02$
3	7	-0.47	10	$p<0.05$
4	5	-0.47	10	$p<0.05$
5	7	-0.69	6	$p<0.02$

The better pain relief patients had on the above days, the less anxious they were on these subsequent days. There was also a lag relationship in the opposite direction, with anxiety on day 2 correlated with pain relief on day 3, $\tau = -0.53$ $n=11$ $p<0.01$. The more anxious patients were on day 2, the less relief they obtained from painkillers on the following day. Other correlations were not significant.

Comments: relationships between these two variables seemed weak overall, especially on a day to day basis. This suggested the mean score results had reflected an independent decrease in these two variables over time, rather than an actual correlation between them. A lag relationship did exist using raw scores, which suggested adequate pain relief may have reduced anxiety. However, the numbers of patients in these correlations was very low at between 6 and 21 patients, thus any interpretation could only be highly tentative.

iii) Postoperative Anxiety and Recovery Inventory

Anxiety scores correlated with recovery inventory scores on day 5 only. $\tau = -0.19$ $n=47$ $p<0.05$. There was no lag relationship in either direction.

iv) Postoperative Anxiety and Self Ratings of Recovery

Table 47 - THE RELATIONSHIP BETWEEN ANXIETY AND SELF RATINGS OF RECOVERY

ANXIETY (DAY)	RECOVERY SELF RATINGS (DAY)	KENDALLS TAU	n	SIGNIFICANCE
1	1	-0.17	26	p>0.05 NS
2	2	-0.05	43	p>0.05 NS
3	3	-0.06	53	p>0.05 NS
4	4	-0.38	39	p<0.001
5	5	-0.33	44	p<0.001
6	6	-0.30	45	p<0.01
7	7	-0.27	40	p<0.01

This indicated the more anxious patients were, the less well recovered

they felt on these days. Conversely, the less well recovered they felt, the more anxious they were. There was also a lag relationship in both directions as tables 48 and 49 illustrated.

Table 48 - THE LAG RELATIONSHIP BETWEEN ANXIETY AND SELF RATINGS OF RECOVERY

ANXIETY (DAY)	RECOVERY SELF RATINGS (DAY)	KENDALLS TAU	n	SIGNIFICANCE
1	4	-0.31	24	p<0.01
1	5	-0.25	23	p<0.056 NS
1	6	-0.35	24	p<0.01
1	7	-0.30	22	p<0.05
3	4	-0.17	45	p<0.05
4	5	-0.28	36	p<0.01
4	6	-0.34	36	p<0.01
4	7	-0.27	34	p<0.02
5	6	-0.28	43	p<0.01
6	7	-0.22	41	p<0.05

This table showed the more anxious patients were, the lower they rated their recovery the following days on days 3,4,5 and 6. Anxiety on day 1 appeared to have a delayed relationship with self ratings of recovery, showing a correlation on days 4,6 and 7. Anxiety on day 4 also showed a delayed relationship with these ratings, affecting them two and three days later.

Table 49 - THE LAG RELATIONSHIP BETWEEN SELF RATINGS OF RECOVERY AND ANXIETY

RECOVERY SELF RATINGS (DAY)	ANXIETY (DAY)	KENDALLS TAU	n	SIGNIFICANCE
4	5	-0.23	41	p<0.02
4	6	-0.37	43	p<0.01
4	7	-0.28	36	p<0.01
5	6	-0.25	43	p<0.02
5	7	-0.26	40	p<0.02
6	7	-0.33	39	p<0.01

This table showed self ratings of recovery on days 4,5 and 6 influenced anxiety scores the following day. Self ratings on day 4 and 5 had a more prolonged influence.

Comments: any relationship between anxiety and recovery inventory scores was extremely weak, if it existed at all. This supported the findings of Sime(1976) who concluded postoperative emotional reactions were not related to length of stay. However, it did not support the findings of Wolfer & Davis(1970). They found postoperative 'fear-anxiety' was negatively correlated with their recovery inventory, on both postoperative assessments for females, and on the second assessment only for males. Whether they would have found the same relationship had they assessed recovery consistently over time was not known. When recovery self ratings were examined, a stronger relationship existed between the two variables. This suggested anxiety influenced how patients felt overall, rather than specific recovery inventory items.

4.7 Supplementary Analysis

Before the results of aims three and four are considered, a supplementary analysis of the first two aims will be presented.

In addition to the relationships between the major variables, the relationships of other variables with pain, pain relief, anxiety and recovery were examined. These other variables included the number of painkilling doses administered, having a morning or afternoon operation, the duration of anaesthesia, the length of stay in hospital, mood, being fed-up and being bored. After these relationships are examined, the association between background variables, such as age, sex and diagnosis, and pain, pain relief anxiety and recovery will be considered, then additional analysis of the scales and inventories used in the study will be presented and their reliability and validity assessed.

4.7.1 The Relationships Between Number of Painkilling Doses and the Major Variables

These relationships were considered separately to the effects of pain and its relief, as there was no evidence that pain, pain relief and painkillers could be used interchangeably to assess pain. The number of doses administered was used rather than milliequivalents of morphine. This method was chosen after discussion with a consultant anaethetist as more useful than the exact quantity, especially since pain relief was assessed separately. From the patients point of view, they would usually know they had been given a painkiller, but would not necessarily know its dose. Furthermore, as Boore(1976) argued, doses varied according to the weight of the patient, therefore it was more appropriate to examine the number of doses used than units of morphine. The numbers of both narcotic and non-narcotic painkillers were recorded.

a) Relationship with Pain

The number of doses of painkillers given were significantly and positively correlated with raw pain scores on days 1,4,5,6 and 7 as table 50 showed.

Table 50 - THE RELATIONSHIP BETWEEN NUMBER OF PAINKILLING DOSES AND RATINGS OF PAIN*

PAIN (DAY)	PAINKILLING DOSES (DAY)	KENDALLS TAU	n	SIGNIFICANCE
1	1	+0.16	65	$p<0.05$
2	2	+0.12	70	$p>0.05$ NS
3	3	+0.14	68	$p>0.05$ NS
4	4	+0.21	68	$p<0.02$
5	5	+0.29	69	$p<0.001$
6	6	+0.36	64	$p<0.001$
7	7	+0.38	68	$p<0.001$

* - Includes patients with no pain and/or receiving no painkillers

Note the strength of the correlation increased from day 2 onwards. Thus the higher patients rated their pain, the more painkillers they received on these days. No clear lag relationships emerged.

Comments: it was difficult before data collection to determine what relationship might be expected between these two variables. A positive relationship would indicate the more pain the patient had, the more painkillers they received, whilst a negative relationship would have suggested the more painkillers the patients received, the less pain they reported, presumably because the painkillers were effective.

The results indicated that in general, the more pain the patient had, the more painkillers they received. This relationship, although still positive, was not significant on the second and third day after surgery. The correlation on the first day was only just significant, and this suggested that on the first three days when patients also had more pain, there was

a tendency for the administration of painkillers not to be related to pain scores. It could be argued that painkillers were therefore administered by some criteria other than pain.

These findings supported those of Wolfer & Davis(1970) and Taenzer et al(1986) who both found a weak positive correlation between pain and number of analgesics after surgery. Johnson et al(1971) reported no such correlation between number of analgesics administered and patients ratings of pain. They assessed pain for the first four postoperative days only, thus since in the present study correlations were not significant on the second and third day after surgery, these results only partly contradicted those of the present study.

A negative relationship between pain and painkillers - the more painkillers a patient had, the less their pain - was not supported by the direction of the relationship. This suggested the number of painkillers the patient received did not acually reduce pain, or was independent of it using day to day comparisons. An examination of lag relationships did not produce any clear patterns to illuminate this relationship. The relationship between the number of painkillers and pain relief which might be expected to be more closely linked, will be examined next.

b) Relationship with Pain Relief

There were no significant day to day correlations between numbers of painkillers and pain relief.

The more pain relief obtained on the first day, the more painkillers were administered on day 2 (τ=+0.29, n=29, p<0.02) and day 3 (τ=+0.25, n=29, P<0.05). Also the more relief obtained on day 5, the more painkillers were administered on days 6 (τ=+0.34, n=17, p<0.05) and 7 (τ=+0.39, n=16, p<0.05). Other relationships were not significant. There was some weak support for pain relief being cumulative as the more painkillers given on days 3 and 4,

the more relief was obtained on day 5. (day 3: τ=+0.35, n=16, p<0.05, day 4: τ=+0.45, n=16, p<0.01).

Comments: the expected relationship between these two variables was arguably that the more painkillers the patients received, the greater their pain relief. The lack of significant same day relationships indicated more painkillers on one day did not lead to significantly greater pain relief that same day. If the effect of pain relief was cumulative, a lag relationship might be expected, with the number of painkillers one day affecting relief the following day. One patient referred to pain relief being "built up in layers". However, the overall pattern of results did not strongly support this relationship.

A limited lag relationship also appeared to operate in the opposite direction, with the more pain relief obtained on one day, the more painkillers were administered on the next. This could be interpreted as better relief gave the patients confidence to ask for painkillers as they knew they could be effective. However, any such interpretation must be made very cautiously and any lag relationship between pain relief and the number of painkillers would appear at best weak and unpredictable.

c) Relationship with Anxiety

Anxiety trait scores showed a significant correlation with the number of painkillers given on day 3 only, τ=+0.17, n=65 p<0.05. The higher the anxiety trait scores, the more painkillers patients received on this day.

Preoperative anxiety state showed no correlation with number of painkillers, whilst postoperative anxiety state correlated with the number of painkillers on day 5 only, τ=+0.22 n=47 p<0.02. The higher anxiety state on this day, the more painkillers patients received.

Comments: the relationship that existed between anxiety and painkillers was at best weak.

d) Relationship with Recovery Inventory

The more painkillers administered on the day of the operation, the less well recovered patients felt on days 1-4 and 7.

Table 51 - THE RELATIONSHIP BETWEEN NUMBER OF PAINKILLING DOSES GIVEN ON DAY OF SURGERY AND RECOVERY INVENTORY SCORES

PAINKILLING DOSES (DAY)	RECOVERY INVENTORY (DAY)	KENDALLS TAU	n	SIGNIFICANCE
OP.	1	-0.21	80	p<0.01
OP.	2	-0.20	80	p<0.01
OP.	3	-0.22	80	p<0.01
OP.	4	-0.16	77	p<0.05
OP.	5	-0.12	76	p>0.05 NS
OP.	6	-0.01	76	p>0.05 NS
OP.	7	-0.21	72	p<0.05

The relationships between painkillers given after surgery and recovery inventory scores are presented in table 52.

Table 52 - THE RELATIONSHIP BETWEEN NUMBER OF PAINKILLING DOSES AND RECOVERY INVENTORY SCORES AFTER SURGERY

PAINKILLING DOSES (DAY)	RECOVERY INVENTORY (DAY)	KENDALLS TAU	n	SIGNIFICANCE
1	1	-0.11	79	p>0.05 NS
2	2	-0.09	79	p>0.05 NS
3	3	-0.04	79	p>0.05 NS
4	4	-0.18	76	p<0.02
5	5	-0.17	76	p<0.05
6	6	-0.21	76	p<0.01
7	7	-0.18	72	p<0.05

The more painkillers patients received on days 4-7, the lower their recovery inventory scores.

e) Relationship with Self Ratings of Recovery

Table 53 illustrated the relationship between the number of painkillers

administered on the day of surgery and patients postoperative self ratings of recovery.

Table 53 - THE RELATIONSHIP BETWEEN NUMBER OF PAINKILLING DOSES GIVEN ON THE DAY OF SURGERY AND SELF RATINGS OF RECOVERY

PAINKILLING DOSES (DAY)	RECOVERY SELF RATINGS (DAY)	KENDALLS TAU	n	SIGNIFICANCE
OP.	1	-0.27	37	p<0.02
OP.	2	-0.25	56	p<0.01
OP.	3	-0.25	58	p<0.01
OP.	4	-0.22	54	p<0.05
OP.	5	-0.10	53	p>0.05 NS
OP.	6	-0.19	52	p<0.05
OP.	7	-0.24	52	p<0.01

Doses of painkillers given on the day of operation affected self ratings of recovery on all postoperative days except day 5.

There were no significant correlations between painkillers given after surgery and self ratings of recovery on a day to day basis.

Comments: the more painkillers given on the day of operation, the lower the recovery inventory scores on days 1-4 and 7 after surgery, and the lower recovery self ratings on days 1-4 and 6-7. Assuming patients with more extensive surgery took longer to recover, this finding suggested nurses may have given painkillers on the day of surgery in relation to the extent of the operation. This may or may not have met the pain relief needs of the patient. Conversely, the fewer painkillers patients had on the day of surgery, the higher their recovery scores on these days. By implication this suggested that painkillers in some way interfered with recovery. That the administration of painkillers on the day of operation was determined to some extent by the nature of surgery seemed more likely to be correct: Davitz & Davitz(1981) found nurses inferences of pain were largely determined by the patients illness. Furthermore, there was no evidence that painkillers slowed recovery. Infact, they would be expected to have promoted

recovery if they relieved pain by facilitating mobilisation and thus reducing the risk of stasis complications. When day to day relationships were considered, no correlations emerged using recovery self ratings, but the more painkillers patients received on days 4-7 after surgery, the lower their recovery inventory scores. This again suggested painkillers may have been administered by operation rather than need. When the number of painkillers administered was investigated by diagnosis, no significant differences between the groups were found, although differences were just outside significance at $p<0.054$ on the day of surgery, with patients having a cholecystectomy receiving more painkillers this day. The lack of relationship between painkillers and recovery inventory scores on days 1-3, when most painkillers were administered, and the lack of any relationship at all with recovery self ratings, suggested that the number of painkillers had no real effect on how fit the patient felt.

4.7.2 The Relationship Between Morning or Afternoon Operation and the Major Variables

Morning surgery accounted for 77.5% of operations, whilst 22.5% were in the afternoon. This had no significant effect on pain, anxiety or either measures of recovery. Pain relief showed a significant relationship on the third postoperative morning only, patients who had undergone an operation in the morning rated their pain relief as better at this time.

Comments: since morning or afternoon operation had no substantial effect on pain, pain relief, anxiety or recovery, these findings justified starting patient interviews on the first postoperative morning, regardless of time of operation, rather than visiting the patient for the first time 24 hours after surgery.

4.7.3 The Relationship Between Duration of Anaesthesia and the Major Variables

The average duration of anaesthesia was 136.87 minutes, range 30-315, median 130, mode 90. The extent to which duration of anaesthesia affected the major variables will now be examined.

a) Relationship with Pain

Duration of anaesthesia had no significant affect on pain scores on any day.

b) Relationship with Pain Relief

Pain relief scores were affected on the third postoperative morning only. The longer the operation, the less relief obtained on this occasion, r_s=-0.29 n=42 p<0.02.

Comments: this suggested that perhaps these patients had more pain after more extensive surgery, which was not well recognised on the third postoperative day. This tied in with the expiry of prescriptions for controlled drugs at this time. That pain on this day was not significantly affected again emphasised the complex relationship between pain and its relief.

c)Relationship with Anxiety

Anxiety scores were affected on the first and fourth postoperative days. The longer the operation, the higher the anxiety scores, day 1 r_s=+0.26 n=29 p<0.05, Day 4 r_s=0.22 n=43 p<0.05.

Comments: longer operations may have entailed more tubes and drains and this could have affected initial anxiety. Why correlations with the fourth day were significant was unclear, although the occurrence of gas pain on this day, if unexpected, may have made the patient more anxious.

d) Relationship with Recovery

Recovery inventory scores were affected on days 4 and 5 only. The longer the operation, the lower the recovery inventory score, day 4 r_s=-0.19 n=77 p<0.05, day 5 r_s=-0.22 n=76 p<0.02. Recovery self ratings were affected on day 2 and throughout days 4-7. The longer the operation, the less well recovered patients felt, as table 54 showed.

Table 54 - RELATIONSHIP BETWEEN DURATION OF ANAESTHESIA AND SELF RATINGS OF RECOVERY

DAY	r_s	n	SIGNIFICANCE
1	-0.12	37	p>0.05 NS
2	-0.20	56	p<0.05
3	-0.17	58	p<0.058 NS
4	-0.33	54	p<0.01
5	-0.27	53	p<0.01
6	-0.25	52	p<0.02
7	-0.32	52	p<0.01

Comments: any relationship with the recovery inventory was weak, but was more marked with self ratings of recovery. The progress of whatever affected how the patient felt appeared to be influenced by a long operation. It seemed reasonable that patients who had extensive surgery tended to feel less fit afterwards.

When the duration of anaesthesia was analysed by diagnosis the following results emerged.

Table 55 - DURATION OF ANAESTHESIA BY DIAGNOSIS

DIAGNOSIS	MEAN (Minutes)	STANDARD DEVIATION	RANGE (Minutes)
Cholecystectomy	110.65	68.44	45-315
Other, Not Cancer	115.38	53.04	30-210
Other, Cancer	174.35	62.47	60-300

χ^2=18.66 p<0.001

Note the wide range in duration of anaesthesia for all groups.

Comments on table 55: this table raised the issue of whether a sample should be restricted to patients undergoing only one type of operation, in order to reduce the effects of extraneous variables. Mathews & Ridgeway(1981) described the, "...possible adverse consequences of using heterogeneous samples..." and recommended, "...delineating surgical procedures..." p255. However, when the seemingly homogeneous group of patients undergoing cholecystectomy was considered, there was a tremendous range in duration of anaesthesia, and thus presumably the extent of the operation. This finding tended to suggest any classification of this group as 'homogeneous' by operation would be rather misleading, especially if postoperative outcome was then assessed. Given the large variation in duration of anaesthesia within the group, homogeneity of operation may have been less important than homogeneity of some other, perhaps unknown, factor. Feldman(1986), although referring to the effects of personality on pain, summed this up when she said, "perhaps some unique combination of variables operate to account for individual differences we see, rather than the more global personality variables." p85. Thus homogeneity may not be important at all, given the large inter-group variation.

4.7.4 The Relationships Between Number of Nights in Hospital After Surgery and the Major Variables

The more pain patients had preoperatively, r_s=+0.20 n=78 p<0.02 and on day 5, r_s=+0.19 n=74 p<0.02, the longer they were in hosptial after surgery. The more pain relief patients obtained on days 2am and 3am, the longer their stay in hospital, day 2 r_s=+0.20 n=51 p<0.05, day 3 r_s=+0.31 n=42 p<0.01. Other pain and pain relief correlations were not significant, nor were there any significant correlations with anxiety trait or any measure of anxiety state.

The number of nights in hospital would be expected to correlate with both recovery inventory scores and self ratings of recovery. This was indeed the case as table 56 indicated.

Table 56 - THE RELATIONSHIP BETWEEN POSTOPERATIVE LENGTH OF STAY AND RECOVERY SCORES

DAY	RECOVERY SELF RATINGS r_s	n	SIGNIFICANCE	RECOVERY INVENTORY r_s	n	SIGNIFICANCE
Pre.	-0.12	74	p>0.05 NS	-0.30	80	p<0.001
1	-0.12	37	p>0.05 NS	-0.47	80	p<0.001
2	-0.12	56	p>0.05 NS	-0.48	80	p<0.001
3	-0.22	58	p<0.01	-0.57	80	p<0.001
4	-0.19	54	p<0.02	-0.53	77	p<0.001
5	-0.23	53	p<0.01	-0.52	76	p<0.001
6	-0.23	52	p<0.01	-0.48	76	p<0.001
7	-0.20	52	p<0.02	-0.47	72	p<0.001

Note correlations were stronger with the recovery inventory and significant throughout, whereas self rating correlations were only significant on days 3-7 after surgery.

Comments: the effects of length of stay were investigated because this has been used on its own as a measure of recovery after surgery. The way in which results using this measure compared with those derived from the two assessments of recovery was examined. The more pain patients had before

their operation, the longer they stayed in hospital after surgery. This relationship was not apparent with either recovery inventory or self ratings of recovery scores. Like recovery inventory scores, days to discharge were not related to postoperative pain. Correlations had been found between self ratings of recovery and pain, see table 34. This suggested days to discharge and the recovery inventory were similar with regards their relationship to postoperative pain.

The more pain relief patients had on the second and third postoperative mornings, the longer they stayed in hospital. This differed from results using recovery inventory scores where no significant relationships emerged, and from self ratings of recovery, where correlations were found on days 4 and 6. This indicated that using days to discharge as a measure of recovery produced different results when correlated with pain relief than did the two other measures of recovery.

There was no significant correlation between anxiety and days to discharge. Correlations between anxiety and recovery were significant on days 4-7 for self ratings and on day 5 for inventory scores. This suggested, like pain, days to discharge were more closely linked with recovery inventory scores (although not exactly) than with self ratings of recovery.

The correlations between days to discharge and both assessment of recovery supported this stronger link with the inventory. Recovery inventory scales were correlated with days to discharge throughout days 1-7, and with self ratings of recovery on days 3-7.

This was an interesting result as it was the first time the recovery inventory had been more sensitive than the recovery self ratings. Perhaps doctors based their decision to discharge patients on recovery inventory items rather than the patients own feelings. It seemed that feelings of fitness for patients on the first two postoperative days had no effect on days to discharge. Perhaps many factors other than recovery affected such feelings these days. This all suggested that eventual length of stay could be

predicted by the recovery inventory score each day, from day 1. Thus the speed with which patients achieved recovery inventory items could predict eventual length of stay. This arguably gave the recovery inventory some predictive validity. Patients own perceptions of their recovery on the first two postoperative days had no bearing on eventual length of stay, but this could be predicted from the third postoperative day. This suggested something other than recovery rate may have been tapped by this question during the first two days. As argued before, it was possible that patients feeling grateful for having survived the surgery overestimated their own recovery. Perhaps the recovery inventory did assess actual progress rather than something more intangible assessed by recovery self ratings. However, for the patient, this more intangible progress seemed equally important. The extent to which it was seen as important by the health professional was unknown.

It appeared therefore, that using the length of stay in hospital could be a reasonable measure of recovery.

4.7.5 Patients Usual Methods of Coping

Before the next section on patients responses to negative moods, being 'fed-up' and being bored, the preoperative 'coping' question results will be presented.

Patients were asked 'If you feel bad or things get bad, is there anyting you do or think to feel better?' Based on the Jaloweic coping scale, 81.3% of responses were classified as an affective response, 6.3% as a problem solving response and 12.5% said there was nothing which they did.

Comments: assessment of coping was adapted from the Jalowiec et al(1984) coping scale. Most (81.3%) of patients fell into the 'affective' coping category, thus further analysis of the effect of coping style on major outcome variables was not undertaken. However, the way in which patients coped with an event like surgery could be very important, and nurses could help patients

utilise their usual methods of coping. It was noted that many patients said they would go for a long walk, listen to music, have a drink or make a cup of tea if they felt bad. In hospital, these methods of coping would be largely unavailable, which may have affected how these patients coped. The classification was not successful in the present study in its ability to differentiate between patients, but this was not to say the coping scale failed. It was not applied in the way the authors had used it, but just as a classification system, see Appendix D.3.

4.7.6 Mood, 'Fed-Up' and Bored and Their Relationship to the Major Variables

The effect of mood, being 'fed-up' and being bored will be discussed, remembering these three fators were classified crudely as 'negative mood', 'fed-up', 'bored', 'not negative mood', 'not fed-up', 'not bored', and as 'mixed'. Preoperatively, 18.8% of patients reported having a 'negative mood', 72.5% as 'not negative' and 8.7% as 'mixed'. The postoperative results are presented in tables 57 to 59.

Table 57 - THE PERCENTAGE DISTRIBUTION OF PATIENTS REPORTING DIFFERENT MOODS

DAY	NEGATIVE MOOD %	NOT NEGATIVE MOOD %	MIXED MOOD %
1	48.6	42.9	8.6
2	45.6	45.6	8.8
3	36.8	55.3	7.9
4	31.9	54.2	13.9
5	29.3	58.7	12.0
6	18.3	69.0	12.7
7	16.7	76.4	6.9

Negative mood gradually decreased over time. Preoperative mood was largely 'not negative' and its effect on postoperative outcomes was not analysed.

Table 58 - THE PERCENTAGE DISTRIBUTION OF PATIENTS REPORTING BEING 'FED-UP'

DAY	FED-UP %	NOT FED-UP %	MIXED %
1	46.9	43.8	9.4
2	47.1	41.4	11.4
3	47.4	46.1	6.6
4	38.4	56.2	5.5
5	45.9	47.3	6.8
6	28.2	62.0	9.9
7	31.9	54.2	13.9

The numbers of patients who reported feeling 'fed-up' were fairly stable for the first three days and declined less than negative mood.

Table 59 - THE PERCENTAGE OF PATIENTS REPORTING BOREDOM

DAY	BORED %	NOT BORED %	MIXED %
1	17.2	79.7	3.1
2	23.2	68.1	8.7
3	26.3	67.1	6.6
4	38.4	53.4	8.2
5	30.1	60.3	9.6
6	31.9	62.5	5.6
7	38.0	57.7	4.2

The numbers of patients who reported boredom showed a trend to increase with time.

a) Mood and its Relationship to the Major Variables

An examination of the relationship of the 'negative', 'not negative' and 'mixed' groups with major variables was undertaken using Kruskal-Wallis analysis of variance.

Table 60 - THE RELATIONSHIP BETWEEN MOOD AND THE MAJOR VARIABLES

VARIABLE	VALUE	df	SIGNIFICANCE
Pain	H=7.42	2	p<0.05
Pain Relief	H=1.30	2	p>0.05 NS
Anxiety	H=8.61	2	p<0.02
Recovery Inventory	H=1.16	2	p>0.05 NS
Recovery Self Rating	H=4.56	2	p>0.05 NS

Mood had a significant relationship with pain and anxiety. Patients reporting a negative mood had significantly more pain and were more anxious.

Comments: that negative mood and pain were linked suggested a central influence could be modulating the pain. It seemed negative mood may have been a reflection of anxiety, to the extent anxiety seemed incompatible with a 'not negative' mood.

b) 'Fed-Up' and its Relationship to the Major Variables

Table 61 - THE RELATIONSHIP BETWEEN 'FED-UP' AND THE MAJOR VARIABLES

VARIABLE	VALUE	df	SIGNIFICANCE
Pain	H=12.98	2	p<0.01
Pain Relief	H= 8.41	2	p<0.02
Anxiety	H= 9.68	2	p<0.01
Recovery Inventory	H=-1.38	2	p>0.05 NS
Recovery Self Rating	H= 0.86	2	p>0.05 NS

Being 'fed-up' was significantly related to pain, pain relief and anxiety. Patients reporting being 'fed-up' had significantly more pain, less pain relief and were more anxious.

Comments: the extent to which being 'fed-up' was separate from negative mood was not known, but it was intended to be a crude measure of depression. This was not meant to imply any degree of clinical depression. Patients themselves differentiated between being 'fed-up' and mood; responses to the two questions were not identical, as tables 57 and 58 showed.

The more pain patients had and the less pain relief they obtained, the more 'fed-up' they felt. Or the more 'fed-up' they were, the more pain and less pain relief they reported. This was not a suprising finding as it seemed reasonable to assume patients with poor pain relief would feel 'fed-up'. There were no significant correlations between 'fed-up' and either measure of recovery. The more anxious patients were the more fed-up they were and this was highly significant, as figure 16 illustrated. To what extent were anxiety and being fed-up or depressed linked? Spielberger et al's (1970) inventory was found to have items more related to depression than anxiety, and whilst the new form Y, Spielberger et al(1983), claimed to eliminate most of these depression items, perhaps the remaining items did measure depression as well. However, this interpretation must be treated cautiously, given the very crude method of assessing 'fed-up'/depression.

c) Bored and its Relationship with the Major Variables

Being bored showed no significant relationship with any of these variables.

Comments: many patients commented they felt too ill on the first few postoperative days to be bored. This might have suggested a positive relationship between being bored and recovery, but being bored was not significantly related to any of the major variables.

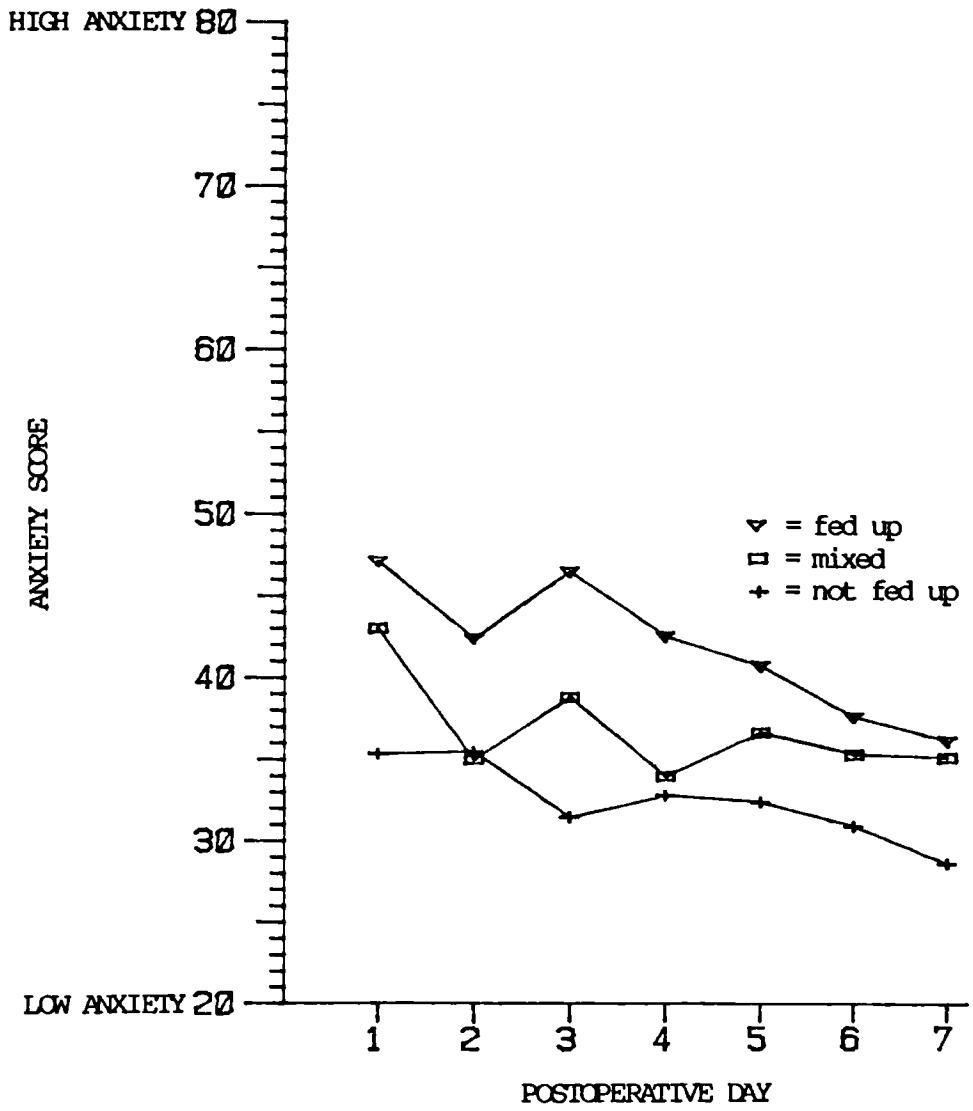

FIGURE 16. Patients Mean Postoperative Anxiety State Scores and their Relationship to Being 'Fed-Up'.

This graph illustrates the differences in anxiety as assessed once a day for the first seven postoperative days between patients reporting being 'fed up' (▽), 'not fed up' (+) and mixed (□). The scores showed patients who were 'fed up' were more likely to be anxious than those patients who were not fed up. This difference was significant using a Kruskal-Wallis analysis of variance $H = 9.68$, $df = 2$, $p < 0.01$

4.7.8 The Relationships Between Background Variables and the Major Variables

To continue this section on the supplementary analysis of the first two aims, the effects of other background variables on pain, pain relief, anxiety and recovery were investigated. These background variables were age, sex, marital status, previous operations, diagnosis, ward and number of pre and post operative nights in hospital. The effects of age, previous operations and pre and post operative nights in hospital were investigated using results which had been recoded into two categories, as explained on page 177.

Again, these results were presented using mean and raw scores. Kruskal-Wallis analysis of variance (H) was used when there were more than two groups, and degrees of freedom (df) are shown. When the Mann-Whitney U-Test was used to examine differences between two groups, the numbers in each group were always the same, 14 for pain and pain relief scores (twice a day for seven consecutive days), and 8 for anxiety and both measures of recovery (preoperatively, then once a day for seven days after surgery).

Comments on these results are presented at the end of this section.

a) Pain

Table 62 - THE RELATIONSHIP OF BACKGROUND VARIABLES TO MEAN PAIN SCORES

VARIABLE	VALUE	df	SIGNIFICANCE
Age	U= 83.00	N/A	p>0.05 NS
Sex	U=102.00	N/A	p>0.05 NS
Marital Status	H= 3.88	3	p>0.05 NS
Previous Operation	U= 84.00	N/A	p>0.05 NS
Diagnosis	H= 10.16	2	p<0.01
Ward	H= 10.92	2	p<0.01
Preoperative Stay	U= 94.00	N/A	p>0.05 NS
Postoperative Stay	U= 74.00	N/A	p>0.05 NS

N/A - Not applicable

This table showed there was a significant difference between patients mean ratings of pain and their diagnosis. This difference was further illustrated by figure 17.

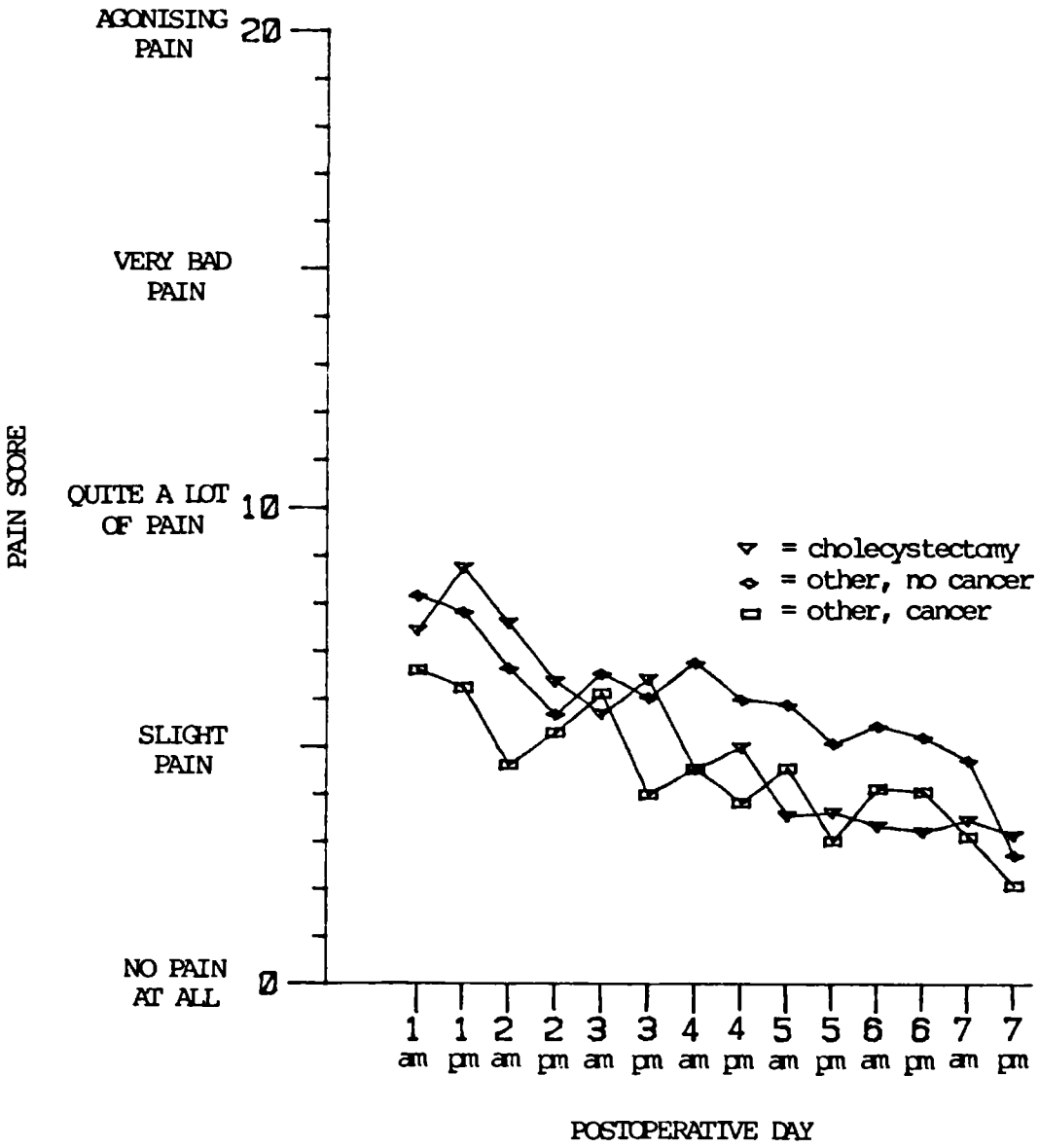

FIGURE 17. Patients Mean Postoperative Pain Scores and their Relationship to Diagnosis.

This graph shows the differences in pain scores (am and pm) as assessed twice a day for the first seven postoperative days, between patients with different diagnoses. These diagnoses were choleycystectomy (▽), other operation, no cancer (◇) and other other operation, cancer (▭). Using these mean scores this difference was significant using a Kruskal-Wallis analysis of variance H= 10.16, df = 2, $p < 0.01$

There was also a significant difference in mean pain scores between wards, with Tyne ward reflecting higher scores initially, then lower, with Tamar ward being more constant throughout, Thames being in between.

Raw Scores

These revealed that females had more pain than males on the first postoperative morning only, U=55 $p<0.05$, and there was a significant difference between wards on the fourth postoperative afternoon, χ^2 6.89 $p<0.05$, Tamar ward patients had more pain than patients on the other two wards. The patients who were in hospital for 3 or more days before surgery rated their preoperative pain as higher than did patients with a preoperative stay of 1 or 2 days, U=585.5 $p<0.05$. Those patients who were in hospital for 12 or more nights after surgery had more pain on the fifth postoperative morning than did patients staying for less than 12 days, U=476 $p<0.02$. All other differences were not significant.

b) Pain Relief

Table 63 - THE RELATIONSHIP OF BACKGROUND VARIABLES TO MEAN PAIN RELIEF SCORES

VARIABLE	VALUE	df	SIGNIFICANCE
Age	U= 60.00	N/A	p>0.05 NS
Sex	U= 87.50	N/A	p>0.05 NS
Marital Status	H= 18.53	3	p<0.001
Previous Operations	U= 91.00	N/A	p>0.05 NS
Diagnosis	H= 8.50	2	p<0.05
Ward	H= 13.52	2	p<0.01
Preoperative Stay	U= 58.00	N/A	p>0.05 NS
Postoperative Stay	U= 50.00	N/A	p<0.05

N/A - Not applicable

Although younger patients tended to rate their pain relief as lower than older patients, this difference was not significant. Widows rated their

pain relief significantly lower than other marital groups. Patients from Thames ward rated their relief as significantly lower than patients from the other wards. Patients who had a cholecystectomy rated their relief as worse than the two other diagnostic groups.

Raw Scores

Using raw scores, older patients obtained significantly less relief on the fifth postoperative morning, $U=55$ $p<0.02$. Diagnosis affected levels of pain relief reported on the first morning, $\chi^2=7.28$ $p<0.05$, fourth morning, $\chi^2=7.03$ $p<0.05$ and seventh afternoon, $\chi^2=7.28$ $p<0.05$, after surgery. Patients who stayed in hospital longer than 11 days after surgery obtained better relief on the third postoperative morning, $U=121.5$ $p<0.01$. (although they did not receive significantly more painkillers). All other differences were not significant.

c) Anxiety

Table 64 - THE RELATIONSHIP OF BACKGROUND VARIABLES TO MEAN ANXIETY STATE SCORES

VARIABLE	VALUE	df	SIGNIFICANCE
Age	U= 35.00	N/A	p>0.05 NS
Sex	U= 8.00	N/A	p<0.05
Marital Status	H= 12.32	3	p<0.01
Previous Operation	U= 28.00	N/A	p>0.05 NS
Diagnosis	H= 3.81	2	p>0.05 NS
Ward	H= 9.36	2	p<0.01
Preoperative Stay	U= 29.00	N/A	p>0.05 NS
Postoperative Stay	U= 22.00	N/A	p>0.05 NS

N/A - Not applicable

Sex Differences in Anxiety Scores

The findings in table 64 showed that females were more anxious than males. Anxiety scores are presented by sex in table 65 and figure 18.

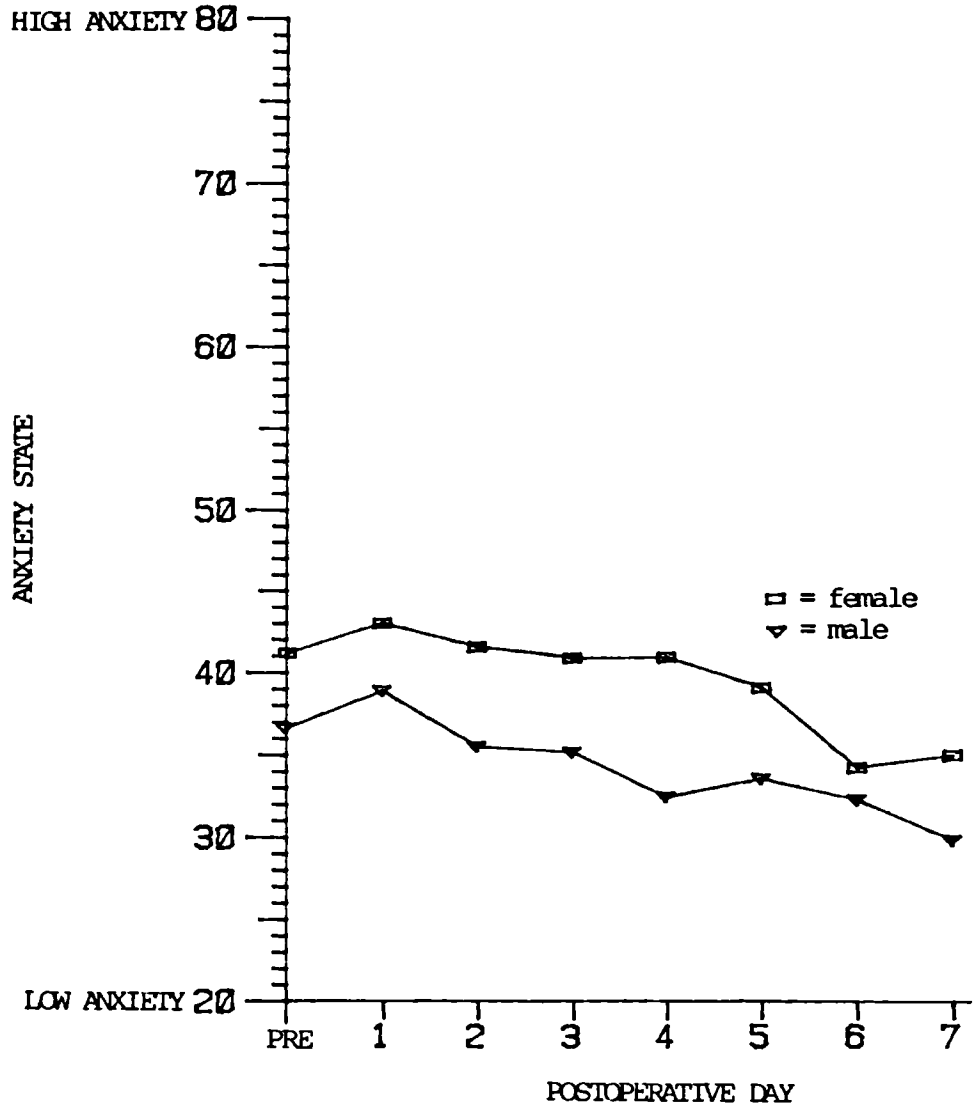

FIGURE 18. Patients Mean Pre and Postoperative Anxiety State Scores and their Relationship to Sex.

This graph illustrates the differences in anxiety state scores between the sexes both preoperatively (PRE) and once a day during the first seven postoperative days. Using these mean scores, a Mann-Whitney U test revealed this difference was significant $U = 8$, $p < 0.05$.

Table 65 - SEX DIFFERENCES BETWEEN PRE AND POSTOPERATIVE ANXIETY SCORES

TYPE OF ANXIETY SCORE	DAY	MEAN SCORE MALE	MEAN SCORE FEMALE
Trait	PREOP.	32.32	38.29
State	PREOP.	36.61	41.16
State	1	38.87	43.00
State	2	35.50	41.57
State	3	35.16	40.89
State	4	32.47	40.95
State	5	33.60	39.12
State	6	32.31	34.28
State	7	29.85	35.04

This table clearly illustrated female patients' mean anxiety scores were consistently higher than those of male patients, both before and after surgery.

Although there were no significant differences in age, older patients tended to have more constant scores, younger patients had higher scores initially, then had lower scores. Mean anxiety scores were also divided by age and sex. There were no significant differences between younger and older females, $U=35$ $p>0.05$, or younger and older males, $U=32$ $p>0.05$. There was a non-significant tendency for younger females to be more anxious over the first few days after surgery. This trend was not apparent with male patients.

When the effect of marital status was investigated, widowed patients were most anxious, then married and least anxious were single and divorced/separated patients. Although there was no significant difference between anxiety and the three diagnostic groups, when cholecystectomy patients were compared with 'other, no cancer' using a Mann-Whitney U Test, there was a significant difference, $U=13$ $p<0.05$: cholecystectomy patients were more anxious. Similar comparisons between cancer and cholecystectomy and between cancer and 'other, no cancer' patients were not significant. A difference in mean anxiety levels was revealed between wards. Tyne ward contained the most anxious, and Tamar the least anxious patients. Patients who had been in hospital more than two days before surgery tended to be more

anxious on the first postoperative day than those who had a shorter preoperative stay. However, overall this difference was not significant. Previous operation had no significant effect on anxiety in either direction.

Raw Scores

The only significant relationship between anxiety raw scores and other variables was with those of sex and ward. On the second postoperative morning, Tyne ward had more anxious patients than Thames or Tamar wards, χ^2=6.44 p<0.05. There was a significant difference in anxiety trait scores between the sexes: females had higher anxiety trait scores than males, U=345.5 p<0.02. State anxiety raw scores did not show this difference. Again, despite the difference in anxiety state mean scores, because of the dispersion of scores, this difference was not significant when raw scores were examined.

d) Self Ratings of Recovery

Table 66 - THE RELATIONSHIP OF BACKGROUND VARIABLES TO MEAN SELF RATINGS OF RECOVERY

VARIABLE	VALUE	df	SIGNIFICANCE
Age	U= 23.00	N/A	p>0.05 NS
Sex	U= 32.00	N/A	p>0.05 NS
Marital Status	H= 0.93	3	p>0.05 NS
Previous Operation	U= 36.00	N/A	p>0.05 NS
Diagnosis	H= 4.36	2	p>0.05 NS
Ward	H= 0.08	2	p>0.05 NS
Preoperative Stay	U= 13.00	N/A	p<0.05
Postoperative Stay	U= 14.00	N/A	p<0.05

N/A - Not applicable

The only background variables which showed a significant relationship with mean self ratings of recovery were length of pre and postoperative stay in hospital. These significant findings in table 66 indicated those patients

who had a longer preoperative and/or postoperative stay rated their own recovery as lower than those with shorter stays. Although analysis of variance did not reveal a significant difference between diagnostic groups, when Mann-Whitney *U* tests were applied to each pair, there was a significant difference between cholecystectomy and 'other, no cancer' patients, $U=13$, $p<0.05$. Cholecystectomy patients had lower self ratings of recovery than patients with 'other, no cancer'. Differences between the other two pairs were not significant.

Raw Scores

There was a significant difference between diagnosis on the first postoperative day, with patients who had a cholecystectomy rating their own recovery below that of the other two groups, $\chi^2=10.72$ $p<0.01$. 'Other, no cancer' patients rated their recovery the highest. Those patients who stayed in hospital more than two days before surgery rated their recovery significantly lower over days 1 and 4-7 than other patients. After surgery, those who eventually stayed in hospital for more than 11 days rated their own recovery as significantly lower than shorter stay patients on days 4,5 and 6. Both these pre and postoperative length of stay differences are reported in table 67. Comparisons were thus between patients in hospital before surgery for either one or two days, and those in for three or more days. Postoperative comparisons were between patients in hospital for upto eleven days and those in for twelve or more days after surgery.

Table 67 - DIFFERENCES IN LENGTH OF STAY AND THEIR RELATIONSHIP TO PATIENTS SELF RATINGS OF RECOVERY (MANN-WHITNEY U TEST)

DAY	PREOPERATIVE (U)	SIGNIFICANCE	POSTOPERATIVE (U)	SIGNIFICANCE
PREOP.	591.5	p>0.05 NS	570.5	p>0.05 NS
1	96.0	p<0.02	127.5	p>0.05 NS
2	349.5	p>0.05 NS	334.0	p>0.05 NS
3	294.0	p<0.055 NS	292.0	p<0.06 NS
4	229.5	p<0.05	241.5	p<0.05
5	202.0	p<0.01	213.5	p<0.02
6	205.0	p<0.02	209.0	p<0.02
7	227.5	p<0.05	241.5	p<0.07 NS

e) Recovery Inventory

RELATIONSHIP OF BACKGROUND VARIABLES TO MEAN RECOVERY INVENTORY SCORES

None of the variables investigated showed any significant differences in relation to the recovery inventory.

Raw Scores

Age was very influential when raw scores were used. Younger patients had significantly higher recovery scores preoperatively and on days 2-7 after surgery. Diagnosis also had a very pronounced affect on recovery inventory scores. Cholecystectomy patients recovery inventory scores were highest, followed by 'other, no cancer', and cancer patients had the lowest scores. When this was contrasted with the findings of these groups in relation to self ratings of recovery, the position of cholecystectomy patients was reversed. The influences of both age and diagnosis on the recovery inventory were presented in table 68. Age comparisons were between patients aged 18-55 and those aged 56 or more, and diagnostic group comparisons between cholecystectomies, 'other, no cancer' and 'cancer'operations.

Table 68 - DIFFERENCES IN AGE AND DIAGNOSTIC GROUP AND THEIR RELATIONSHIP TO RECOVERY INVENTORY SCORES

DAY	AGE (U)	SIGNIFICANCE	DIAGNOSIS (H)	SIGNIFICANCE
PRE.	521.5	P<0.01	10.58	p<0.01
1	606.0	P<0.06 NS	7.42	p<0.02
2	523.5	P<0.01	14.90	p<0.001
3	418.5	P<0.001	20.00	p<0.001
4	439.5	P<0.01	17.71	p<0.001
5	474.0	P<0.02	18.15	p<0.001
6	442.0	P<0.01	11.35	p<0.01
7	438.5	P<0.01	9.92	p<0.01

Table 69 revealed that pre and postoperative length of stay affected the recovery inventory scores on all postoperative days. The groups with longer lengths of stay had significantly lower recovery inventory scores. Again, preoperative comparisons were thus for patients in hospital for either one or two days, or three or more days. Postoperative comparisons were between patients in hospital for upto eleven days, and those in for twelve or more days after surgery.

Table 69 - DIFFERENCES IN LENGTH OF STAY AND THEIR RELATIONSHIP TO RECOVERY INVENTORY SCORES

DAY	PREOPERATIVE (U)	SIGNIFICANCE	POSTOPERATIVE (U)	SIGNIFICANCE
PRE.	323.0	p<0.01	504.0	p<0.002
1	301.0	p<0.001	268.0	p<0.001
2	245.0	p<0.001	196.0	p<0.001
3	238.5	p<0.001	134.5	p<0.001
4	197.5	p<0.001	132.0	p<0.001
5	211.5	p<0.001	114.5	p<0.001
6	252.0	p<0.001	159.5	p<0.001
7	315.0	p<0.01	170.5	p<0.001

These results reflected more extensive significance than those using self ratings of recovery, where only days 4-7 were significantly related to preoperative stay, and days 4-6 to postoperative stay.

4.7.9 Relationship Between Background Variables and the Number of Painkilling Doses Administered

Mean Scores

There were no significant differences when mean scores were considered.

Raw Scores

Painkillers had no significant effect on mood, being fed-up or being bored. The number of painkillers taken were significantly influenced by sex, with females receiving more painkillers than males on day 2, $U=565.5$ $p<0.05$, and by previous surgery, with patients with previous experience of surgery receiving more painkillers on day 2, $U=511$ $p<0.05$ and day 3, $U=506$ $p<0.02$, than patients with no previous surgical experience. There was a non-significant tendency for younger patients to have more painkillers than older patients. All other differences were non significant.

Comments on Effect of Background Variables on the Major Variables: the differences between raw scores and mean scores and their clinical significance were important. Whilst relationships could be significant using mean scores, this often disappeared when raw scores were used. This again emphasised that patients should not be assessed purely by some group characteristic as there was such divergence within these groups.

Few strong patterns of relationships emerged when the effects of age, sex, marital status, previous operation, diagnosis, ward, and pre and postoperative length of stay on pain, pain relief, anxiety and recovery were investigated. For example, although females were significantly more anxious than males when mean scores were considered, when raw scores were used, this difference was not significant for any anxiety state scores.

Consistent patterns that did emerge included the effects of age and diagnosis on recovery inventory scores, as table 68 showed. Younger patients had higher recovery inventory scores on days 2-7 after surgery, and cholecystectomy patients had the highest recovery inventory scores, followed by 'other no cancer' with patients with cancer having the lowest recovery inventory scores throughout the seven days. Interestingly, this strong relationship was not apparent when the relationship with recovery self ratings was considered. This added support to the argument that the recovery inventory tapped a different process than that assessed by recovery self ratings. Age and diagnosis thus affected the speed with which patients achieved 'objective' inventory items, but not self ratings of recovery. Age and diagnosis were not particularly influential as far as pain, pain relief or anxiety were concerned.

That significant differences varied according to whether mean or raw scores were used, and that the days on which raw scores were assessed at times affected whether a variable was seen as significantly influential or not at least partly explained why other studies, cited in the literature review, had produced seemingly contradictory findings over the relationships between background variables and pain, pain relief, anxiety and recovery.

4.7.10 Changes in Scores Over Time and their Relationship with the Major Variables

To investigate any possible effect of time on the major variables, patients were divided into two groups; the first forty and the second forty patients in the sample. The effect of time on pain scores revealed no significant differences in mean or raw scores on any day. Pain relief ratings showed no significant differences in raw scores, but a significant difference in mean scores, $U=43.5$ $p<0.05$. The second forty patients reported better levels of pain relief, although there was no significant difference in the numbers of painkillers given to the two groups. Anxiety scores were

found to be significantly lower in the second forty patients using mean scores, $U=13$ $p<0.05$, and significantly less on the fourth day using raw scores, $U=143$ $p<0.05$. Recovery self ratings showed no significant differences using mean scores, although raw scores revealed the second forty patients rated their recovery as higher on the fourth postoperative day, $U=220.5$ $p<0.02$. Recovery inventory mean scores showed no differences, whilst raw scores were significantly different on the first, $U=517.5$ $p<0.01$, and second, $U=557.5$ $p<0.02$, day. The first forty patients had lower recovery inventory scores than the second forty patients.

Comments: using raw scores, there were no changes in pain scores, pain relief or the number of painkillers administered between the first forty and the second forty patients. The second forty were less anxious on one day, had higher self ratings of recovery on one day and higher recovery inventory scores on two days. There was thus a fairly weak tendency for the second forty be less anxious and better recovered than the first forty patients. However, there was not a large difference in responses over time. This suggested the context in which the study was conducted remained substantially unaltered throughout the period of data collection.

4.7.11 Additional Analysis of Pain, Pain Relief and Recovery Inventory Scores

In this section on the supplementary analysis of the first two aims, additional analyses of selected data were undertaken.

a) Clustering of Pain Scores

Figure 19 clearly showed most patients and nurses marked the pain scale over the words describing pain, (see Appendix A.2 for further details).

Comments: This indicated the scale was very much seen by the patients as ordinal and confirmed the use of parametric tests was not appropriate. It also tended to refute claims that verbal rating scale data can be treated as interval. Only 7.8% of responses made by patients and 3.6% of nurses responses were between words. These responses were skewed towards no pain, as Cushceri, Morran & McArdle(1985) had found. Why nurses marked between words less than did patients is uncertain, over 57% marking 'no pain at all'. It was interesting to note that patients marking between words did so more frequently at lower pain intensities. Thus 'very bad pain' or 'agonising pain' tended to be just that, whereas ratings of lower intensities were more widely spread between words. Perhaps very bad pain was more all consuming, whereas at lower intensities the patient could be more reflective and exact in their assessment.

b) Clustering of Pain Relief Scores

Although no nurse ratings of pain relief were available, figure 20 showed most patients marked the pain relief scale over verbal descriptors, (see Appendix A.3 for further details).

Comments: this again emphasised the ordinal nature of the data obtained from this scale. Patients were more likely to mark between words at low levels of pain relief. However, the numbers involved were low and no conclusion can be drawn from this data.

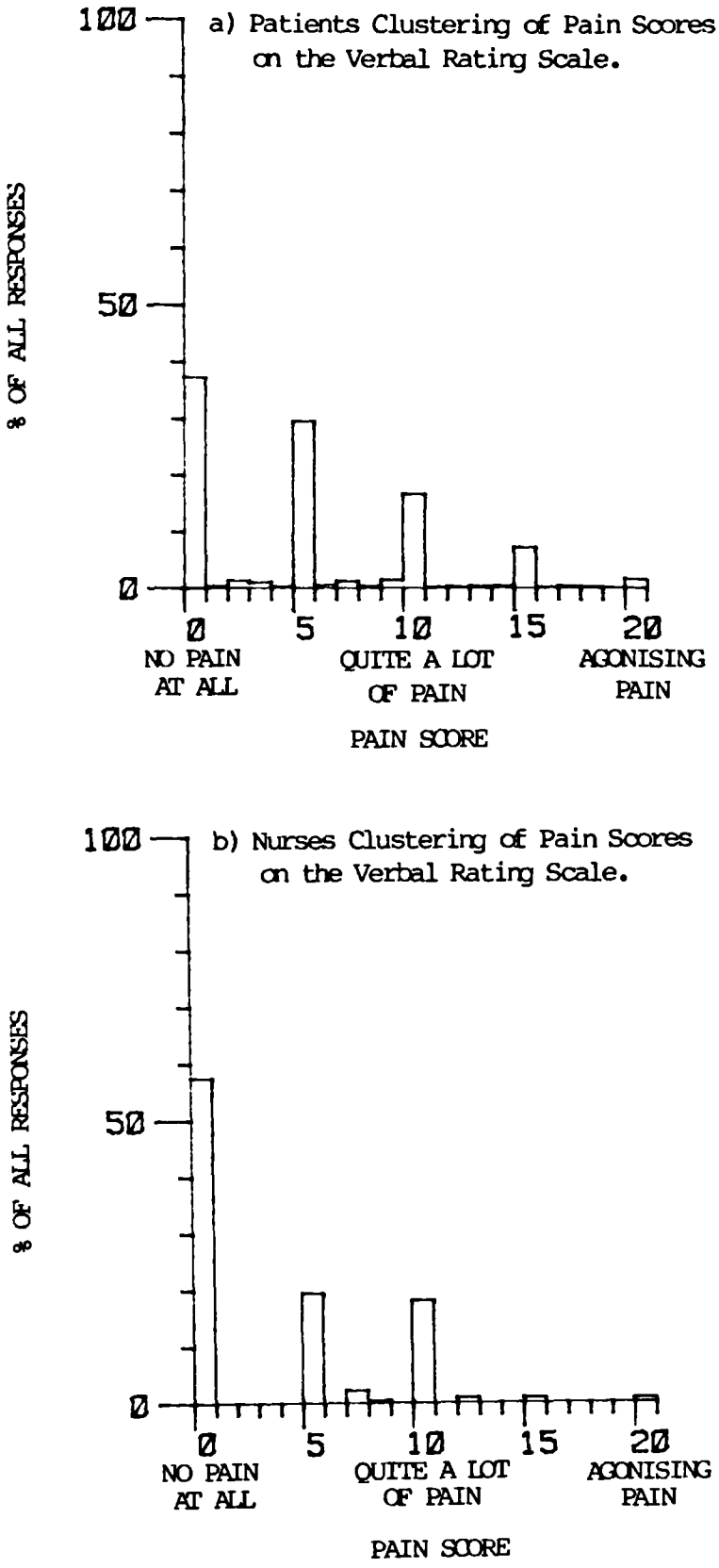

FIGURE 19. Clustering of Pain Scores on the Verbal Rating Scale.

This figure shows the percentage distribution of all patients' and all nurses' ratings of pain. It illustrates that responses are clustered over the words by both nurses and patients. The actual numbers involved are presented in Appendix A.2.

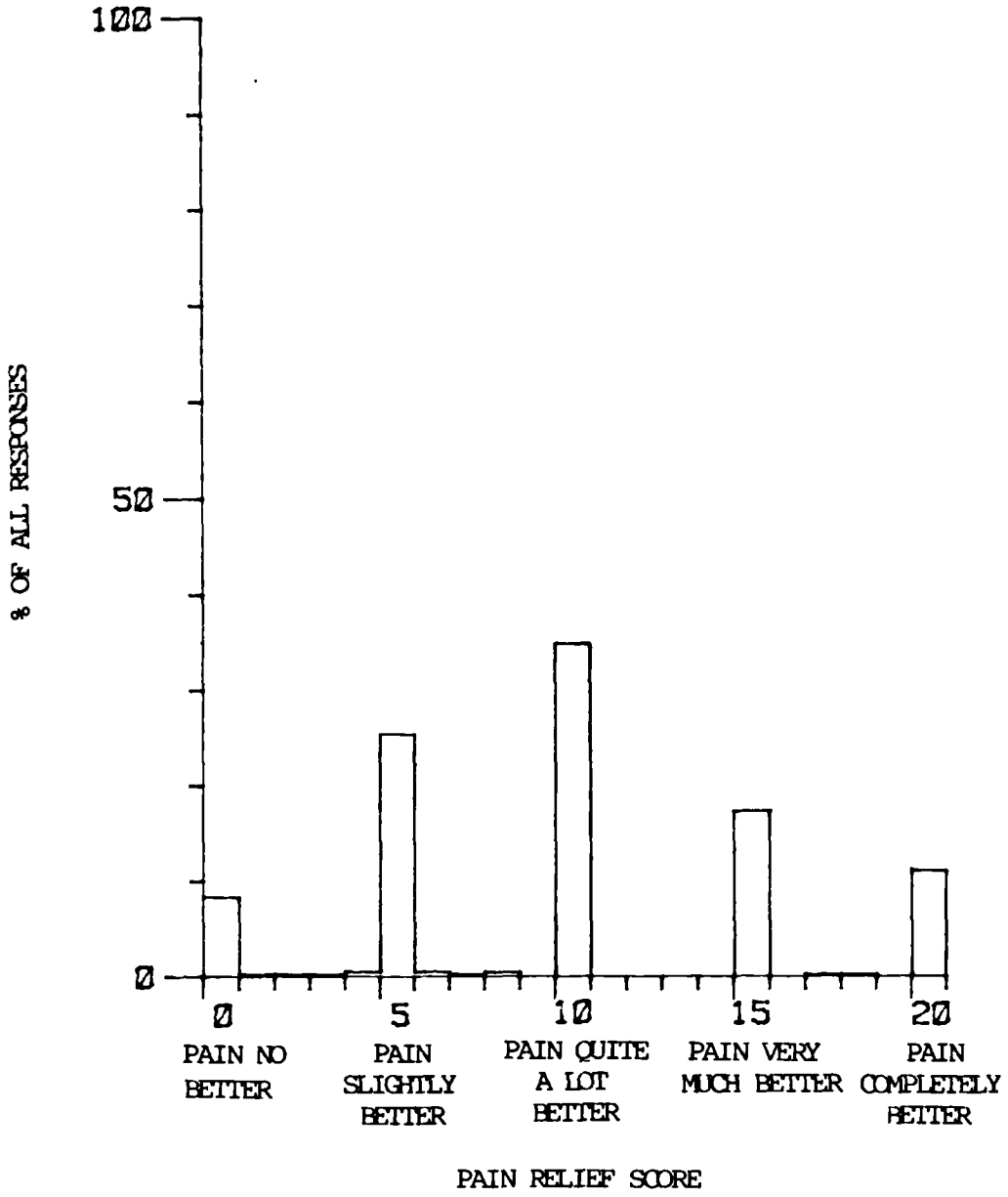

FIGURE 20. Clustering of Patients Pain Relief Scores on the Verbal Rating Scale.

This figure illustrates the percentage distribution of all patients' ratings of pain relief. It shows that responses are clustered over the words. The actual numbers involved are presented in Appendix A.3.

c) Recovery Inventory Scores - Additional Analysis

Each of the twenty-two items comprising the recovery inventory were studied separately. For each day a score was calculated, representing the percentage of patients that day who had achieved that item. Each of the twenty-two indicators were then plotted against the overall mean recovery inventory score. Once each of the indicators was plotted preoperatively and over the seven postoperative days, four distinct groups or types of curve emerged, shown in figure 21 a-d, (see Appendix A.4 for further details). These will now be described.

The first group included nine of the recovery inventory items, and was termed 'Fast Physiological'. To be included in this group the item had to show an inital drop in value after surgery and postoperatively to have between four and seven points equal or above the recovery inventory mean. In this group the curve tended to be similar shape to the mean curve, but to its left. The curve thus returned towards preoperative levels more quickly than the mean. In this group were the items passing urine, 30ml water an hour, 60ml water an hour, independent moving in bed, independent transferring to chair, independent washing, walking to the end of the bed, walking out to the toilet, and interest in surroundings. All items were above the mean by day three. Thus all had at least five values which were above the recovery inventory mean.

The second distinct group included four of the recovery inventory items and was termed 'Slow Physiological'. To be included in this group the item had to show an initial drop in value after surgery and postoperatively have between one and three points equal or above the recovery inventory mean. In this group the curve tended to be similar shape to the mean curve, but to its right initially, none were above the mean before the fifth postoperative day. The curve thus returned towards preoperative levels more slowly than the mean until the fifth day. This group included free fluids, bowels open, walking out of the ward and taking oral food.

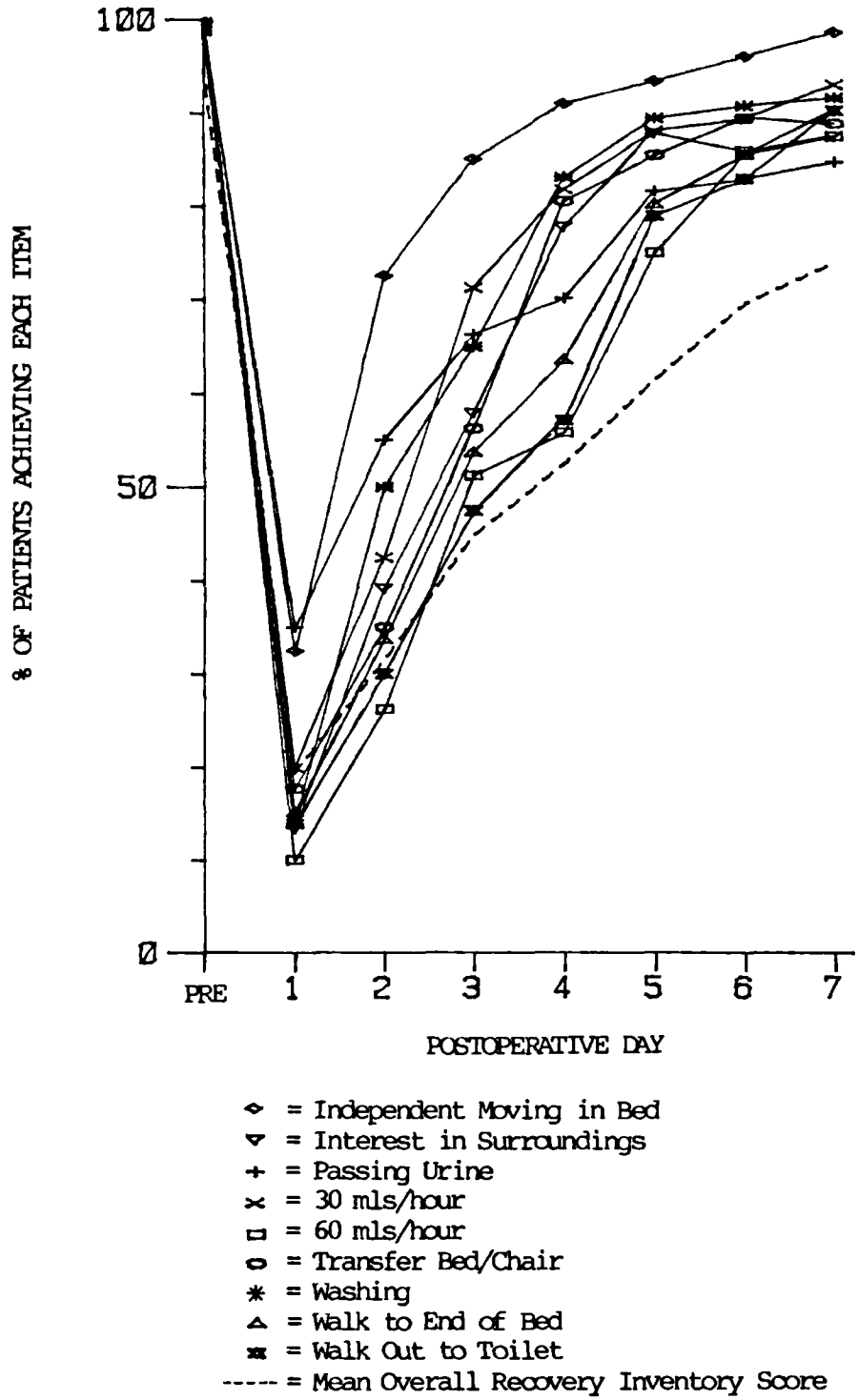

FIGURE 21a. The Percentage of Patients Achieving Each Recovery Inventory Item Per Day - The 'Fast Physiological Group'.

This graph illustrates the progress of nine recovery inventory items, termed 'fast physiological', in relation to overall mean recovery inventory score. All items shown an intial drop in value after surgery and postoperatively have between 4 and 7 points equal or above the recovery inventory mean.

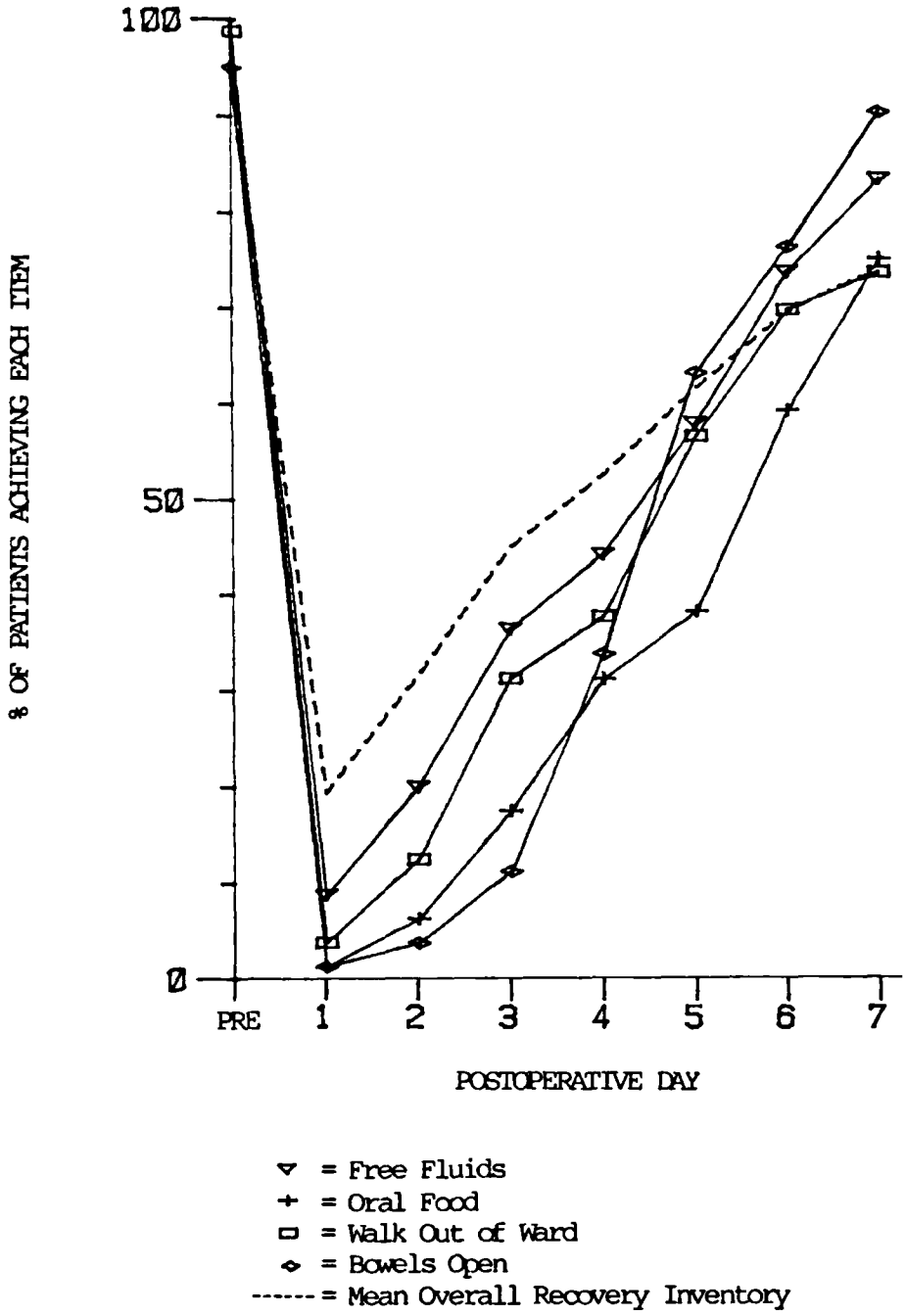

FIGURE 21b. The Percentage of Patients Achieving Each Recovery Inventory Item Per Day - The 'Slow Physiological Group'.

This graph charts the progress of four recovery items, termed 'slow physiological', in relation to the overall mean recovery inventory score. All items show an initial drop in value after surgery and postoperative have between 1 and 3 points equal or above the recovery mean.

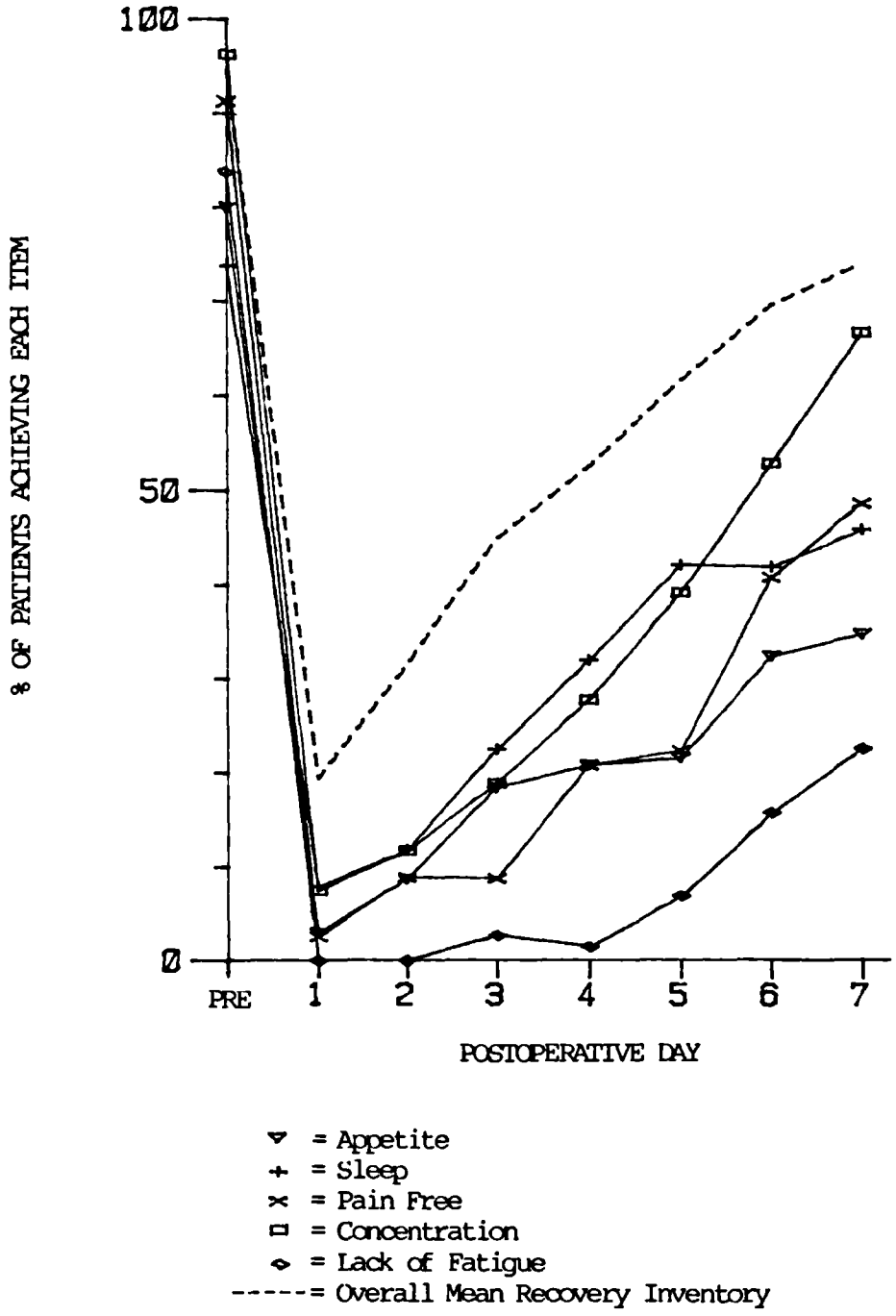

FIGURE 21c. The Percentage of Patients Achieving Each Recovery Inventory Item Per Day - The 'Psychological' Group.

This graph illustrates the progress of five recovery inventory items, termed 'Psychological', in relation to the overall mean recovery inventory score. All items show an initial drop in value after surgery and postoperatively all points are below the recovery inventory mean.

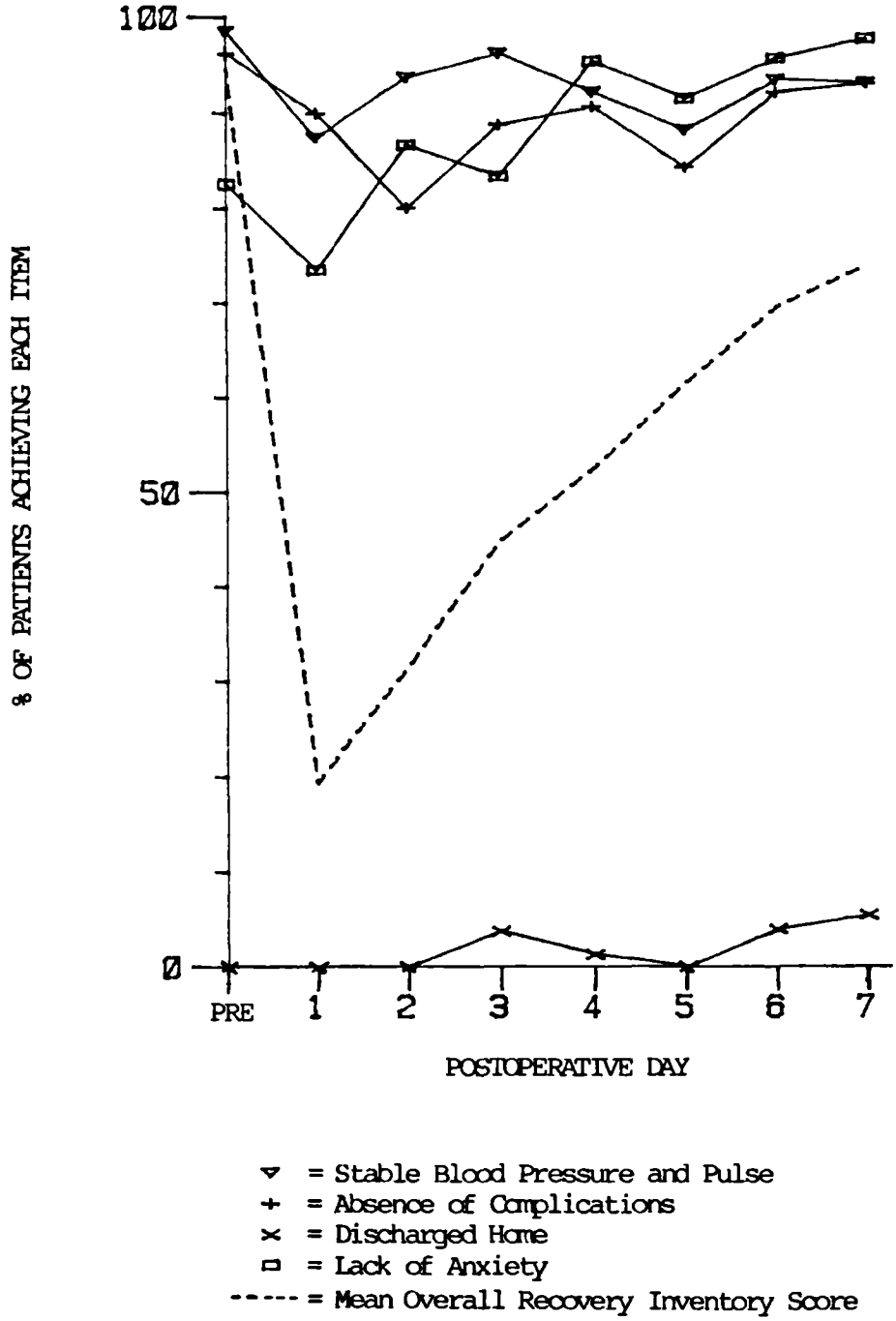

FIGURE 21d. The Percentage of Patients Achieving Each Recovery Inventory Item Per Day - The 'Miscellaneous' Group.

This graph demonstrates the progress of the final four recovery inventory items, termed 'Miscellaneous', in relation to the overall mean recovery inventory score. They all show little variation over time.

The third group included five items and was termed 'Psychological'. To be included in this group the item had to show an initial drop in value after surgery and postoperatively have all points below the recovery inventory mean. In this group the curve tended to be similar to the mean, but consistently to its right. Thus items in this group took much longer than average to return towards preoperative levels. Included in this group were appetite, sleep, being pain free, fatigue and concentration.

The fourth group included four items and was termed 'Miscellaneous'. The curves were a different shape from the mean, each item having a comparatively small variation over time. The incidence was either high and stayed high as in absence of complications, stable pulse and blood pressure and lack of anxiety or low and stayed low as in discharged home.

Comments: 'Fast Physiological' contained very much the variables one would expect to show the most rapid return towards normal. The only seemingly incongruous variable in this group was 'interest in surroundings', which followed a physiological rather than psychological type curve. Perhaps, when awake, there was very little else for the patient to do, other than take an interest in what was going on in the ward. The distraction activity in the ward provided and patient commardarie perhaps increased this interest.

'Slow Physiological' again contained variables of a physiological nature which one would expect to recover more slowly than those in the first group. The average curve of this group was thus to the right of the overall mean for the first few days, then moved to its left.

'Psychological' indicators formed an interesting group. All were much lower than the overall mean, but had a similar curve showing an increase over time. All of the indicators in this group arguably had some physiological component, (appetite, fatigue, concentration, sleep and pain free) but did not follow the physiological pattern of progress. Interestingly, pain free was not in a physiological category as the administration of analgesics might lead one to expect, (this administration erroneously suggested that pain

levels returned quickly towards normal), but was more linked to 'psychological' aspects. That the pain curve was not purely physiological emphasised the multidimensional nature of pain. Hospital food may have had a part to play in ratings of appetite, as many patients commented how could they have an appetite with food like that.

The 'Miscellaneous' group probably represented poor indicators of recovery in this particular situation and with these patients as there was little variation over time. Stable pulse and blood pressure may have been useful in much shorter term studies, for example, the first few hours after surgery. Discharge may have been more useful in longer term studies, where the numbers of patients being discharged might have been higher. Absence of complications was not a positive indicator but represented more an absence of regression. The fairly low incidence of complications meant this indicator had high values. Thus the wisdom of its inclusion as an indicator was doubtful. Lack of anxiety, although again a rather negative indicator, was perhaps not of such doubtful use. The reason for its small variation over time was that only the top 10% of elevations from trait to state anxiety were included, which necessarily restricted its range. The wisdom of including only the top 10% could be questioned as at best arbitrary. However, the decision as to what represents 'high' anxiety for a patient is a difficult one. Of all the items in the miscellaneous group this one showed the most variation over time, gradually increasing, and as such was perhaps the most useful of an otherwise dubious group. They were probably poor indicators of recovery, showed little variation and fell outside Johnston & Lee-Jones'(1979) definition of recovery as, "...the systematic, unidirectional changes occurring in patients over time following surgery." p355. They were rather negative indicators which reflected a lack of regression rather than positive recovery.

It seemed from these results that physical or 'objective' indicators of recovery returned towards normal more quickly than psychological or

'subjective' indicators which tended to lag behind. How did this relate to patients own ratings of recovery, which could probably be considered more subjective. They were certainly less extreme than recovery inventory items. Since 'psychological' items on the recovery inventory showed a marked drop on the first postoperative day, this suggested the less extreme decline in self ratings of recovery at this time could be mediated by the rapid improvement of the 'fast physiological' items: the patient had survived the operation and had made some progress, and this in turn influenced their own ratings of recovery. Perhaps patients were on a bit of a 'high' at this time and rated their own recovery accordingly. The recovery self ratings did flatten out, which suggested psychological indicators had more of an effect on how patients felt on the later days. Whilst recovery inventory scores increased fairly rapidly, there was a lag behind on how patients were actually feeling: the psychological indicators seemed to be exerting an effect. Overall perceptions of recovery seemed to be at least partly influenced by more slowly recovering variables. This again raised the question of weighting of recovery inventory items. Whilst drinking may be a very important boost to the patient at the time, on subsequent days the fact they are feeling exhausted or unable to concentrate may exert much more of an effect on how they feel.

Thus if all items on the recovery inventory were not equally important for the patient, this may explain at least partly the differences between the recovery inventory and self ratings.

4.8 RELIABILITY AND VALIDITY FINDINGS

The reliability and validity of assessments of pain, pain relief, anxiety and recovery will now be considered.

a) Pain Scales

Reliability

Kendall's correlation revealed a mean test-retest value for the pain scales of $\tau = +0.94$ (Range +0.89–+0.99).

Validity

This was shown by a decrease in pain scores over the postoperative period, Nunnally(1981).

Comments: the pain scale appeared to be reliable, although the test-retest correlation coefficient may have been augmented as the scale was conceptualised as ordinal by most patients: they may have remembered and reproduced their earlier rating. If the patient was seen as the authority about their pain, then their ratings of pain should be taken as valid. The scale was sensitive to individual differences.

b) Pain Relief Scales

Comments: this scale was also sensitive to individual differences, but the numbers of patients completing it were low, so reliability and validity were difficult to establish. Consequently, less emphasis should be placed on results derived from this scale. Part of the difficulty in determining validity of the scale was the nature of pain relief over time: should it get better, worse or be unchanged? Ratings could have been retested to establish reliability but this was not undertaken. Although patients asked to re-rated their pain could be told this was to see if pain had changed over the course

of the interview, this explanation could not be used for pain relief scales. It seemed there would have been very few occasions when pain relief changed during the course of the interview, thus a re-rating may have been seen as repetitive by the patient, or as checking up on them, which would not enhance rapport. The initial assumption was that the pain and pain relief scales were similar and thus had similar psychometric properties, but this could not be confirmed.

c) Anxiety

Reliability

Table 70 - TEST-RETEST RELIABILITY OF THE STATE-TRAIT ANXIETY INVENTORY

SCALE	n	PERIOD OF TEST	r_s	SIGNIFICANCE
Trait	10	Preoperative and Day 7	+0.83	$p<0.01$
State	10	Preoperative and Day 7	+0.48	$p>0.05$
State	44	Preoperative and Day 7	+0.39	$p<0.01$

This table showed that when trait scores were retested for the first ten patients on day seven they were highly correlated with preoperative scores. When the same comparison was made with state scores, the two ratings were not significantly correlated. However, when the anxiety state retest was performed on all patients who completed preoperative and seventh day assessments, although the correlation was lower it was significant. The reliability of the anxiety state scale was assessed using Cronbach's(1951) alpha correlation of internal consistency.

Table 71 - INTERNAL CONSISTENCY OF THE STATE TRAIT ANXIETY INVENTORY

SCALE	GROUP	ALPHA CORRELATION*
Trait and State	All Cases	0.92
Trait	All Cases	0.90
State	All Cases	0.93
State	Males Only	0.92
State	Females Only	0.93
State	All, Preoperative	0.93
State	All, Day 1	0.93
State	All, Day 2	0.90
State	All, Day 3	0.94
State	All, Day 4	0.93
State	All, Day 5	0.94
State	All, Day 6	0.92
State	All, Day 7	0.93

* - No levels of significance are used with this test

Validity

This was shown by a rise in anxiety state over anxiety trait before surgery, a time of stress, and after an initial rise after surgery, by a gradual reduction in anxiety over time, Nunnally(1981).

Comments: the alpha correlations for all days and sub-groups suggested this inventory was internally consistent. Test-retest correlations were high for the stable anxiety trait and lower for the changing anxiety state, which was as expected. The limitations of the STAI, discussed on pages 339 to 341, seemed not to have affected the reliability data, which indicated the test was fairly robust. This scale was sensitive to individual differences.

d) Recovery Inventory

Cronbach's alpha correlation was also used with the recovery inventory items, although Kuder-Richardson formula 20 (K-R 20) is usually used with dichotomous items, because the SPSS manual update, Hull & Nie(1981) stated, "If the data are in dichotomous form, alpha is equivalent to the reliability coefficent K-R 20." p256.

Reliability

Table 72 - INTERNAL CONSISTENCY OF THE RECOVERY INVENTORY (ALL ITEMS)

GROUP	ALPHA CORRELATION
All	0.91
Males	0.91
Females	0.90
Cholecystectomy	0.91
Other, No Cancer	0.90
Other, Cancer	0.91
Preoperative	0.64
Day 1	0.77
Day 2	0.79
Day 3	0.83
Day 4	0.85
Day 5	0.85
Day 6	0.85
Day 7	0.85

When all four items which seemed the least likely to reflect measures of recovery (lack of anxiety, absence of complications, stable pulse and blood pressure and discharge home) were excluded, the alpha correlation was 0.93.

When this test is used, items should not influence each other. The assumption in the SPSS manual update was, "The observed values of an individual on an item are experimentally independent of the observed value for that individual on any other item." p249, Hull & Nie(1981). It was felt there were two groups of three items which did influence each other. These were 1) 30ml, 60ml, free fluids and 2) walking to the end of the bed, walking out to the toilet and walking out of the ward: Patients who had free fluids also had 30 and 60 ml, and patients who walked out of the ward also walked past the end of the bed and the toilet. To compensate for any effects these two groups might have, alpha correlations were computed using only free fluids and walking out of the ward from these two groups, with all other recovery inventory items. The correlation was 0.89.

Validity

A Spearman's Rank Correlation between recovery inventory and recovery self rating scores showed they were highly correlated, $r_s=+1$ $p<0.001$. Raw scores were also correlated on preoperatively, and on days 2-7, being just outside significance on day 1. Note the low numbers on day 1. These correlations are presented in table 73.

Table 73 - THE RELATIONSHIP BETWEEN RECOVERY INVENTORY SCORES AND SELF RATINGS OF RECOVERY

DAY	r_s	n	SIGNIFICANCE
PRE	+0.20	74	$p<0.02$
1	+0.17	37	$p<0.08$ NS
2	+0.25	56	$p<0.01$
3	+0.25	58	$p<0.01$
4	+0.27	54	$p<0.01$
5	+0.30	53	$p<0.01$
6	+0.29	52	$p<0.01$
7	+0.20	52	$p<0.05$

This table indicated their was concurrent validity between the two recovery scores.

Comments: Cronbach's alpha correlations indicated this inventory was internally consistent. It appeared to have predictive validity in that patients who had longer stays in hospital both before and after surgery had significantly lower recovery inventory scores on all days. Thus a patient with a low score on, for example, the first day after surgery might reasonably be expected to spend longer in hospital than a patient with higher scores on that day. This finding also gave rather crude support to the validity of the inventory if it was assumed patients were not sent home until they had reached a certain stage of recovery in the doctors judgement. Validity was demonstrated in that scores decreased immediately after surgery then gradually increased over time. This scale was sensitive to individual differences.

e) Recovery Self Ratings

There appeared to be concurrent validity between these and recovery inventory scores, as table 73 showed. Reliability was not assessed separately. The relationship between the inventory and self ratings of recovery has been discussed more fully on pages 207-208 and 215-216.

4.9 Coding

a) Patient Interviews

The data from ten randomly selected patients were recoded by a person unconnected with the study. The pain and pain relief scales, the STAI and the recovery inventory were all recoded, as was the rest of the interview schedule. Intercoder agreement was 96.34% for the entire interview schedule, (including ratings of pain, pain relief, anxiety and recovery), and was 86% when only open ended questions were considered. Causes of discomfort and how pain made the patient feel accounted for 62% of intercoder disagreement with the open ended questions. If these were excluded, agreement over coding of the open ended questions would be 90.71%.

b) Nurses Questionnaires

All 28 nurses questionnaires were recoded in the same manner. Intercoder agreement was 100% for the multiple choice questions and 81.65% for open ended questions.

Comments: these results for patients interviews and nurses questionnaires indicated there was a high level of intercoder reliability.

4.10 PAIN, ANXIETY AND RECOVERY: THEIR RELATIONSHIP

Finally in this section looking at findings in relation to the first two aims of the study, the relationship between pain, anxiety and recovery will be examined. There has been very little work undertaken which has considered the relationship between these variables.

The results indicated the relationship between these variables was complex, and the exact way in which the interrelationships operated was difficult to determine. Initially, at the outset of the study, each of the variables pain, anxiety and recovery was viewed very much as separate from each other. It was thought at this stage that to examine the effect of A on B would be relatively straightforward. As the study progressed, it soon became clear that this approach grossly oversimplified the situation. Each variable had facets common with the other. For example, both pain and anxiety may produce fatigue, a concept which is often part of the recovery process. Perhaps these varied results could have been predicted by a multidimensional model of pain, where pain can be influenced by so many different variables. However, the question arose as to what extent these three variables were independent concepts.

First, the relationship between pairs of variables will be considered and then the relationship between all three variables will be examined.

4.10.1 Anxiety and Pain

Gross & Collins(1981) argued, "statements concerning the role of anxiety in pain or pain in anxiety are generally confounded by the interrelationship of the two." p376. In the present study, patients often made comments such as, "'I feel self-confident/I feel joyful' all depend on your pain." This indicated anxiety and pain were linked to a certain extent in the patients mind.

This link has been support by several authors. For example,

Weisenberg(1983) argued that increased anxiety was associated with increased pain, but that the exact relationship was not fully understood. Anxiety and pain were described as "closely interblended" by Barber, Spanos & Chaves(1974) and thus difficult to measure. A slightly different emphasis was put on this relationship by Chapman & Feather(1973) who described anxiety as a crucial part of the motivational/emotional aspect of pain. They argued that a decrease in anxiety would reduce the suffering associated with pain. This argument was later elaborated by Chapman(1985) who stated one could not distinguish between purely psychological anxiety and the anxiety component of pain, again suggesting the two concepts are closely linked. Another example of the way in which anxiety is incorporated into the assessment of pain was provided by Newton et al(1964) who devised a pain scale consisting of five components, one of which was anxiety.

How much, therefore, can pain and anxiety be treated as separate concepts? Considering the apparent relationship between the two variables, one would expect a high degree of correlations between them. The relationship between pain and anxiety in the present study there was certainly at least a trend for the two variables to be correlated. This was summed up by Gross & Collins(1981) who described them as, "...independent though interacting states." p375.

4.10.2 Pain and Recovery

This area has attracted relatively little comment from the literature. According to Dodson(1985), little is known about the, "extent to which pain affects recovery." p12. The present study found no strong relationship between pain and recovery inventory scores, and a limited relationship between pain and self ratings of recovery. Although pain may dampen the patients morale and, theoretically at least, increase the risk of stasis complications, in the present study it seemed not to exert a marked effect on more 'objective' indicators of recovery. However, this was only one aspect of

recovery, and the effect of pain on more subjective feelings of recovery was more apparent. It would seem that pain and recovery, although linked, were perhaps more independent of each other than were anxiety and pain.

4.10.3 Recovery and Anxiety

Recovery and anxiety revealed mixed relationships: the relationship with recovery inventory scores was very limited, whilst those of recovery self ratings were more marked on the later postoperative days. It seemed anxiety was not strongly related to more 'objective' indicators of recovery, whilst, especially as the patient began to recover, it did affect 'subjective' ratings. This also supported the concept of anxiety as a general negative mood state.

4.10.4 Overall Interrelationships

That pain and anxiety are likely to be inversely related to recovery in the normal course of events, regardless of the effects each has on the other, cannot be ignored. It seemed patients would become relatively pain free and recover to some extent eventually, whatever they suffered in the process. Little is known about the interrelation between each pair, and even less about the interrelation between all three variables. However, during the course of the study it has emerged that what ever relationship did exist, it was certainly complex. Its exact nature and way in which it operated was unclear. There may have been a circular relationship between the variables, especially between pain and anxiety, which may have been inseparable in the clinical situation, if not theoretically. For example, increased anxiety may lead to increased fatigue which in turn may make the patient more susceptible to pain. If the variables had overlapping component parts, a high correlation between them might be expected. This was not the case, suggesting that only part of the total concept was being assessed, and one's ignorance over not only what constituted pain or anxiety or recovery,

but also which facets or components of these variables were important. The findings of this study must be acknowledged as representing, for example, 'pain as assessed by a verbal rating scale' rather than 'pain'. One explanation for the fairly low correlation is that the importance of different facets of the variables may alter between individuals or within an individual over time. Other factors, such as a patient's social support network, may again alter priorities. Thus different facets of a variable (which may not even be recognised as important) might interact with facets from the other variables, with differing results at different times.

A further complicating factor when attempting to assess this relationship was that pain, anxiety and recovery all have physical and psychological components and are each complex concepts. As each variable is multifaceted, it is likely different parts will be affected in different ways. As knowledge of all the component parts of each variable is at best incomplete, the extent to which the assessment of each can be regarded as complete is open to debate and thus trying to discern a relationship between them is an even more arduous task. It is rather like trying to piece together a complex jigsaw puzzle with only a vague idea of the picture one is trying to assemble, whilst possessing only some of the pieces, and not knowing which pieces are missing. It is possible that some important 'pieces' in this study were missing.

The sometimes patchy significance, from which no clear conclusions could reasonably be drawn, was at least partly due to the variability between patients and the way in which they moved towards less pain, less anxiety and better recovery at different rates. This suggested that the postoperative day selected, (more or less arbitrarily when only one or two postoperative assessments are made) may well affect the study results.

It was impossible to conclude A affected B in a clearly defined way. Pain, anxiety and recovery were intertwined. The implications were, on a very broad level, that a reduction in pain would reduce anxiety (and visa

versa), which in turn would increase patients self ratings of recovery. Although it is useful to understand, as far as possible, how different variables interact, it is central to nursing that having considered the parts, one than deals with the whole person. The interrelationship between these variables, plus the influences of many other factors, form the whole which represents the patients experience.

4.11 The Relationship Between Pain, Pain Relief and Painkillers

Again this relationship was complex, but it was clear that more painkillers did not necessarily lead to better pain relief, and better pain relief did not automatically mean less pain. The most important point was that these three concepts should not be used interchangably, as if they were the same variable, when assessing pain.

4.12 The Findings of this Study in Relation to the Gate Theory of Pain

The Gate Theory provided a framework to account for multiple influences on pain. Using this theory, the pain experience could be modulated on the way to or be modulated by higher centres. The Gate Theory was certainly supported by the present study, in that many factors appeared to influence pain other than the extent of the injury. The Gate Theory provided a theoretical framework to explain the association between anxiety on pain, and many other relationships. Given the myriad of potential influences on pain, it was not suprising there was so much variation between individuals, regardless of operation. However, despite the usefulness of such a theory in providing a theoretical basis for such findings, it explains findings after the event, and does not allow for prediction, other than that experiences will be very variable. There is no knowledge of the strength of the various influences, thus one has to be content with expecting different reactions to what on the face of it appear to be very similar stimuli.

4.13 NURSES' AND PATIENTS' RATINGS OF PAIN RELIEF

This section examines the results of an analysis of the third aim, which was to ascertain any differences between the nurses' and the patients' ratings of the patients' pain and pain relief.

4.13.1 Pain

Figure 22 illustrated the difference between nurses' and patients' ratings of the patients' pain. These results are presented in table 74.

Table 74 - NURSES' AND PATIENTS' PAIRED MEAN RATINGS OF THE PATIENTS' PAIN

DAY	NURSES RATINGS		n OF PAIRS	PATIENTS RATINGS	
	Mean	Standard Deviation		Mean	Standard Deviation
1am	4.52	4.90	33	8.60	6.96
1pm	6.20	4.82	10	9.70	6.56
2am	4.39	4.24	33	7.30	5.05
2pm	4.50	6.85	10	5.00	5.27
3am	5.10	4.88	20	8.20	5.55
3pm	2.17	3.69	17	4.52	3.95
4am	3.47	4.24	17	6.17	4.85
4pm	0.90	2.01	11	5.27	4.33
5am	2.13	3.33	15	4.00	4.30
5pm	2.72	3.43	11	5.45	6.87
6am	1.76	3.03	17	5.17	5.17
6pm	1.25	3.53	08	5.00	5.34
7am	0.00	0.00	09	5.55	7.26
7pm	2.50	2.63	10	5.00	4.08

There were problems in obtaining nurses' ratings, the numbers of which were as low as 10% of the total possible at times. On average, 73.25% of nurses were unavailable to rate the patients pain, this ranged from 53.8% to 82.5% unavailable. Thus these results may not have been representative. However, figure 22 included 221 separate pairs of nurse and patient ratings.

A Wilcoxon Signed Rank test revealed that nurses significantly and

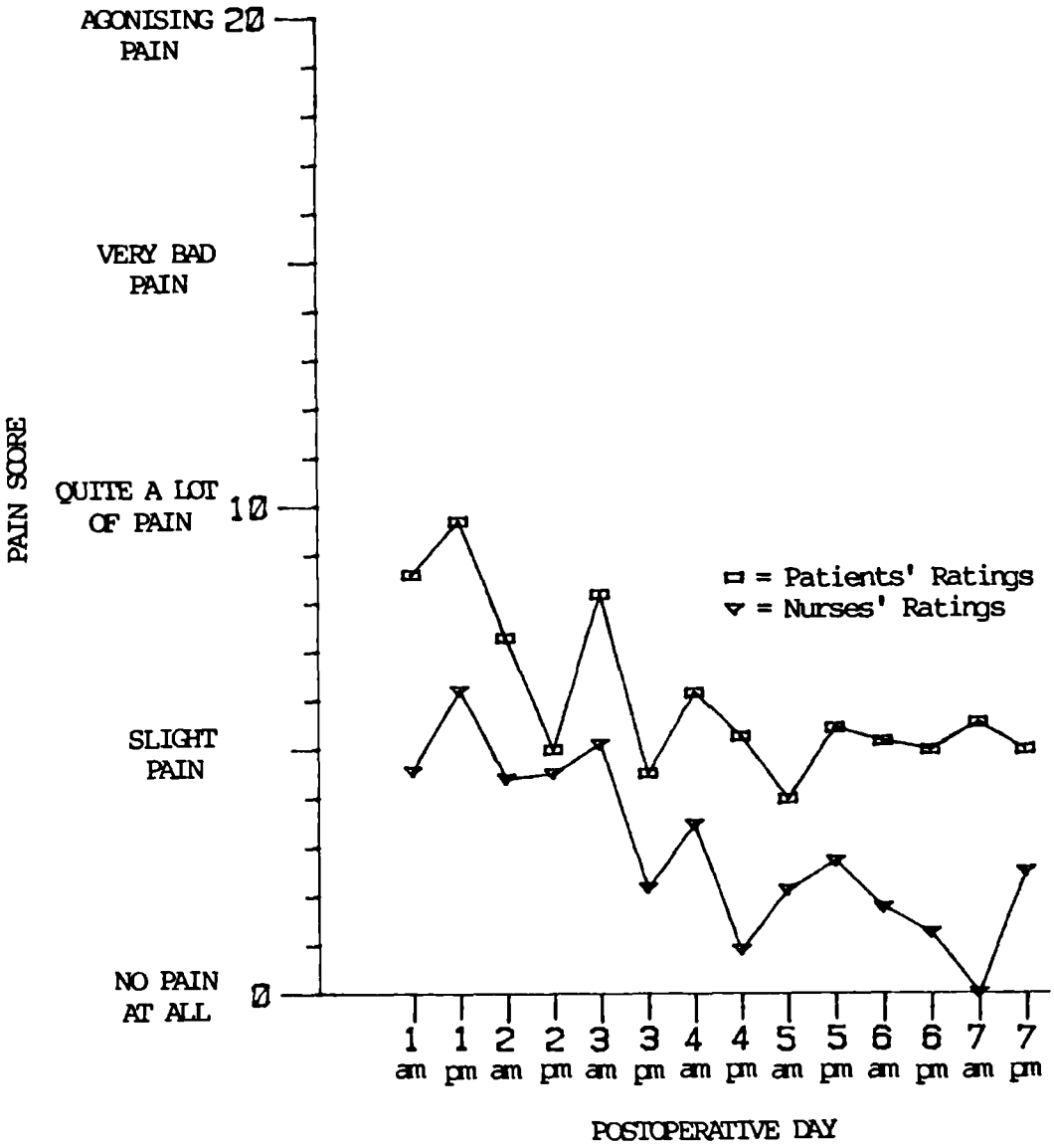

FIGURE 22. Nurses' and Patients' Paired Mean Ratings of the Patients' Pain.

This graph illustrates the patients' and the nurses' mean pain scores, as rated twice a day (am and pm) during the first seven postoperative days. The nurses' ratings were consistently lower than the patients' ratings, and this difference was significant using a Wilcoxon signed rank test, T=0 $p<0.001$. The patients' mean ratings are paired with those of the nurse (221 separate paired ratings) and thus are different from all patients mean ratings, ilustrated in figure 10.

consistently rated the patients' pain lower than did the patient, T=0, $p<0.001$. An investigation of the raw scores provided further insight into these ratings, as table 75 revealed.

Table 75 - THE NUMBER OF NURSES RATING THE PATIENTS PAIN AS MORE THAN OR LESS THAN THE PATIENTS RATING

DAY	n of PAIRS	n NURSE LESS THAN PATIENT	n NURSE MORE THAN PATIENT	n RATINGS THE SAME
1am	33	20	4	9
1pm	10	5	3	2
2am	33	19	4	10
2pm	10	4	3	3
3am	20	12	4	4
3pm	17	8	2	7
4am	17	9	3	5
4pm	11	6	0	5
5am	15	7	2	6
5pm	11	5	1	5
6am	17	10	1	6
6pm	08	5	1	2
7am	09	4	0	5
7pm	10	5	1	4
TOTAL	221	119 (54%)	29 (13%)	73 (33%)

For 77% of the time (54+13) nurses and patients did not agree, 54% of nurses rated the patients pain as less and 13% as more than did the patient. It was interesting to note 94% of nurses ratings were made by nurse learners, as table 76 showed.

Table 76 - GRADE OF NURSE RATING PATIENTS PAIN

GRADE	%	n*
Student	74.38	180
Pupil	19.83	48
State Enrolled	4.53	11
State Registered	1.24	3
TOTAL	99.98	242

* - Although there were 221 pairs of ratings, there were an additional two ratings made by nurses where the patient rating was unavailable for pairing, and nineteen where the nurse did not know how much pain the patient was in.

Raw Scores

Using a Wilcoxon Signed Rank Test, there were significant differences between nurse and patient ratings of pain on days 1am, 2am, 4am, 4pm, and 6am, as table 77 showed.

Table 77 - DIFFERENCES BETWEEN NURSES AND PATIENTS RATINGS OF PAIN (RAW SCORES)

DAY	WILCOXON SIGNED RANK (z)	n OF PAIRS	SIGNIFICANCE
1am	-2.86	33	p<0.01
1pm	-1.54	10	p>0.05 NS
2am	-2.70	33	p<0.01
2pm	-0.34	10	p>0.05 NS
3am	-1.78	20	p<0.08 NS
3pm	-1.78	17	p<0.08 NS
4am	-2.31	17	p<0.05
4pm	-2.20	11	p<0.05
5am	-1.48	15	p>0.05 NS
5pm	-1.57	11	p>0.05 NS
6am	-2.44	17	p<0.02
6pm	-1.26	08	p>0.05 NS
7am	-1.82	09	p<0.07 NS
7pm	-1.57	10	p>0.05 NS

The most common type of comment made by the nurses was, 'He hasn't complained of any', although few comments were made to qualify pain assessments. One nurse said, "I'd say slight pain, though I expect she'd (the patient) would say it was terrible." Another nurse remarked, "She always has pain whenever you ask her and I'm sure she has, she just always moans about it, whereas most people don't - what do you expect after an operation?" Another nurse expressed frustration when she remarked, "Her pain isn't under control - its right up the shoot. I don't know what to do with her."

Comments: agreement over ratings of pain between nurses and patients only occurred in 33% of ratings. This percentage was felt to be quite low given the nurses and the patients tended to cluster responses over the words. Pain was rated higher by 13% and lower by 54% of the nurses. As the mean results showed ratings were consistently lower, this suggested that when nurses rated pain as higher than did the patient, it was not much higher, whilst when they rated it lower, it was much lower than the patient's rating. However, significant differences between nurses and patients paired ratings of the patients pain appeared to be inconsistent. Table 77 suggested non-significant differences occurred more frequently when the number of pairs

of ratings was low. The nurses comments suggested nurses and patients did not always agree over ratings of pain, or over the amount of pain which 'should' be endured. It was not uncommon for the nurse to say the patient was 'fine' and in no pain, when the patient's version was somewhat different. This finding supported that of Graffam(1981) who found disparity in 65% of nurses and patients ratings of the patients pain. She also found where there was disagreement, at least 80% of patients judged the pain to be more severe.

It seemed that nurses did not always know the patient was in pain. Were the patients hiding or denying their pain, or were the nurses just not assessing pain with the patient? Whilst the first suggestion may have applied to some patients, it could probably have been overridden if patients were directly questioned. Lack of pain assessment by nurses could be inferred from some of their comments. When asked about the patients pain typical responses included, "they haven't complained of any", "they were OK yesterday" and "I don't know, I've been on days off". This lack of assessment by the nurse was also found by Graffam(1981).

That 94% of nurses ratings of the patients pain were made by student or pupil nurses showed the patients in this study were predominantly cared for by learner nurses. No attempt was made to differentiate between the year of the nurses training. There was no easy way of unobtrusively distinguishing between first and second year nurses, short of memorising their name and then consulting the off duty rota. Since so many different nurses were involved, this was not felt to be practical. Third year students had a band on their cap. This was not used as the year of the nurse was not felt to be of major importance: whoever looked after the patient had to assess pain. If they did not recognise pain and deal with it appropriately, the patient suffered, whatever the nurse's grade. It could be argued that a junior or even introductory course nurse looking after a patient could not be expected to assess their pain. First, there was little evidence that anyone assessed pain in a systematic way (other than asking 'anything for pain?' on

the drug round). Second, if these nurses who looked after the patient did not assess pain, it was unlikely anyone else would. Their knowledge of the patients pain was crucial from the patients perspective. The pilot study had already suggested that trained staff in charge of the ward did not know about patients pain. This may have indicated junior staff were not passing on this information (even if they had it) to trained staff.

Since many of the nurses were unavailable rate the patients pain, (on no occasion did more than half the nurses looking after study patients rate patients pain), the representativeness of these findings must be called into question. The nurse (who was asked 5 minutes before or after the patient was interviewed) was often with another patient continuously throughout this time, or out of the ward. The impression was gained that occasionally the nurses were deliberately avoiding the researcher, but this could not be verified. The extent to which the nurses who were unavailable would have rated the patients pain as did the patient did unknown. Learner nurses seemed to have so many responsibilities for which they were answerable, those of pain relief, for which they did not seem accountable, appeared, on occasions to be 'shelved' until they could find time to attend to these needs. Whether or not the nurse concerned felt this was the best course of action was not investigated.

The extent to which it was reasonable to expect nurses to know the patients pain was debatable, especially when the study was based on the premise that the patient was the only authority on their pain. However, if the nurse did not know about the pain, unless the patients asked for and received a painkiller, they may have suffered unnecessarily, just because pain was not assessed.

4.13.2 Pain Relief

a) Nurses

A question to enable direct comparisons between nurses' and patients' ratings of the patients' pain relief was dropped after pilot study work. It had caused too much hostility, as discussed in the methods.

A questionnaire was given to all 28 trained staff on the study wards at the end of data collection, to elicit their opinions on aspects of pain relief. There was only one male member of staff, so sex was not recorded. Nurses comments were very diverse, but where comments were made more than once, these were reported. Demographic details of the trained staff were presented in tables 78 to 80.

Table 78 - AGE OF QUESTIONNAIRE RESPONDENTS

AGE	%*	n
18-25	62.96	17
26 PLUS	37.03	10
TOTAL	99.99	27

* 1 nurse did not answer this question.

Table 79 - QUALIFICATIONS OF QUESTIONNAIRE RESPONDENTS

QUALIFICATION	%	n
State Registered Nurse	64.28	18
State Enrolled Nurse	35.91	10
TOTAL	99.99	28

Where the groups of registered and enrolled nurses differed in their pattern of responses, this was reported.

Table 80 - LENGTH OF TIME RESPONDENTS HAD BEEN ON THE WARD

TIME ON WARD	%*	n
0- 6 Months	40.74	11
7-18 Months	37.04	10
19 Months-5 Years	18.52	5
More than 5 Years	3.70	1
TOTAL	100.00	27

* 1 nurse did not answer this question.

Although direct comparisons between patients and nurses ratings of pain relief were not possible, the nurses questionnaire elicited useful information. It was interesting to note that many of the nurses wanted more time to answer the questionnaire, (although was no time limit was imposed by the researcher), and/or complete it at home. Nurses were asked to complete the questionnaire on the ward and not to take it home, as it was felt they had to make decisions about pain relief quickly, on a busy ward in their day to day practice, and completing the questionnaire in this environment would be more akin to normal practice.

Nurses were asked "In general, do you think analgesics on this ward:- Are more than the patient needs, meet the patient's need or are less than the patient needs?" Their responses are listed in Table 81.

Table 81 - RESPONSES TO "DO ANALGESICS MEET PATIENTS' NEEDS?"*

PATIENT NEED	%	n
Are More Than The Patients' Needs -	0.0	0
Meet The Patients' Needs -	75.0	21
Are Less Than The Patients' Needs -	21.4	6
Don't Know -	3.6	1
TOTAL	100.0	28

* - Adapted from Cohen(1980)

Three nurses commented that staff shortages meant patients did not always get a painkiller when they needed it.

Comments on table 81: this apparently high level of satisfation with painkillers was supported by Weis et al(1983) who found 74% of nurses in their study felt pain relief was adequate, and by Cohen(1982) who found 82% of nurses felt painkillers met the patients' needs. This satisfaction did not contrast that sharply with the patients own assessment: whilst 21% of nurses felt painkillers were less than the patients' needs, 29% of patients wanted another painkiller when questioned. The extent to which other patient responses and ratings substantiated the nurses confidence in analgesics was less convincing. Although a global question revealed 61.1% of patients (compared to the 79.8% in Cohen's(1980) study) had found pain control as or better than expected, specific questions revealed a different pattern. On the first postoperative night, pain disturbed the sleep of 66% of patients. Ratings of pain showed 43.25% of patients had quite alot of pain or more on day 1 and 32.5% felt, retrospectively, they could not have a painkiller when they wanted one. These findings raised two issues. First, the extent to which patients had low expectations of pain relief if they described this level of pain as adequate pain relief. Hunt et al(1977) also concluded that patients had low expectations from pain relief. Second, as nearly one third of patients had felt unable to have another painkiller when they wanted one on the first postoperative day, the extent to which they felt in control of their situation was uncertain. They were forced to rely on someone else for their pain relief, which was not always forthcoming, which in turn could have engendered feelings of helplessness. Perhaps patients were not given painkillers because the prescriptions for painkillers were inflexible. However, when drug charts were examined, 92.15% of narcotics and 93.60% of non-narcotics were given at more than the prescribed minimum time interval. This suggested nurses were not especially constrained by inflexible

prescriptions for painkillers. The number of doses given at less than the maximum dose were not calculated as many PRN prescriptions did not have flexible dosages. The numbers of patients who wanted another painkiller may have been under-represented as patients sometimes remarked they did not want another painkiller because, "It doesn't do any good anyway". Thus although three quarters of nurses felt pain control was adequate, this was not reflected in the patients responses.

Nurses were also asked 'What do you think is the aim of giving painkillers on the first two days after abdominal surgery?"

Table 82 - AIM OF PAIN RELIEF ON THE FIRST TWO POSTOPERATIVE DAYS*

AIM	%	n
To completely relieve pain	32.14	9
To relieve as much pain as possible	67.85	19
To relieve just enough for the patient to function	0.00	0
To relieve pain so the patient can just tolerate it	0.00	0
TOTAL	99.99	28

* - Adapted from Cohen(1980)

Comments included seven nurses adding they aimed to prevent complications and allow mobility and coughing. Three stated 'You can't expect to relieve pain totally'. The ratio of nurses aiming for complete relief compared to as much as possible was 1:1.56 for registered nurses and 1:4 for enrolled nurses.

Comments on table 82: all nurses said their aim in giving painkillers on the second postoperative day was to relieve pain completely or as much as possible. Cohen(1980) and Sofaer(1984) found a more diverse spread of responses, with just over 66% and 88% of their sample of nurses respectively who had these aims, the others aimed for less relief. Perhaps nurses have become more aware of need to relieve pain. They did place emphasis on the need to prevent postoperative complications via pain relief. It seemed, on

reflection, that the definition of 'as much as possible' was rather too wide to be helpful. Some nurses, from their comments, expected patients to have a certain amount of pain after surgery, and 'as much as possible' could be interpreted as 'as much as they get, given our time and staff constraints'. It is implicit in nursing that nurses relieve suffering, thus would not deliberately let the patient suffer. Perhaps by not assessing pain and thus not knowing about it for sure, they avoided this potential conflict. On reflection 'as much as possible', as used by Cohen(1980) was too loose a definition or description to be helpful from the perspective of interpretation. The difference between the aims of enrolled and registered nurses suggested a different approach to pain relief between these two groups.

The next table considered whether nurses expected patients to ask for a painkiller if they wanted one.

Table 83 - RESPONSES TO "IN GENERAL DO YOU FEEL PATIENTS USUALLY ASK FOR A PAINKILLER POSTOPERATIVELY IF THEY NEED ONE?"

ALTERNATIVES	%	n
Almost Always	35.71	10
Often	32.14	9
Sometimes	32.14	9
Almost Never	0.00	0
Don't Know	0.00	0
TOTAL	99.99	28

The nurses comments included, 'Patients are often unwilling to ask/bother the nurse'(n=5), 'It depends on nationality'(n=3) and 'Patients are sometimes unaware that analgesics are available'(n=2).

Comments on table 83: nearly 68% of these nurses felt the patient would almost always or often ask for a painkiller if they needed one. This compared to only 37.5% of patients who felt they would ask for a painkiller: 42% expected the nurse to know. One patient said, "I expect the nurse to know automatically." The nurses comments indicated that some were aware of problems of communication, and by implication they had a role in monitoring patients who might not ask, although this was not specifically articulated by any nurse.

Thus most nurses tended to think analgesics met the patients needs, they aimed for complete relief of pain or as much as possible, and tended to assume patients would often or almost always ask for a painkiller if they needed one.

Most analgesic drugs, 95%, were prescribed on an 'as required' or 'pro re nata' (PRN) basis. The next table examined when these PRN drugs were given.

Table 84 - RESPONSES TO "IN GENERAL, ON THE SECOND POSTOPERATIVE DAY, WHEN PETHIDINE 100mg HAS BEEN PRESCRIBED PRN 3-4 HOURLY, WOULD YOU GIVE IT:"*

ALTERNATIVES	%	n
Always every 3-4 hours	10.71	3
Wait for patient to ask	17.86	5
See if it is needed on the drug round	17.86	5
See if it is needed every 3-4 hours	39.28	11
Other	14.28	4
Don't Know	0.00	0
TOTAL	99.99	28

* - Adapted from Sofaer(1984)

Comments included 'Give milder analgesics if pain not too bad'(n=3), 'Give prior to a procedure'(n=3), 'Depends on type of surgery' (n=2) and 'Give between the drug rounds as necessary'(n=2). Most nurses said they would see if the patient needed a painkiller every 3-4 hours. However, a student nurse remarked, "She leaves it too long until the pain is bad to ask and she doesn't cover herself with analgesics." This indicated the patient was sometimes expected to assume responsibility in asking for pain relief.

Comments on table 84: the numbers of nurses who would wait for the patient to ask for a painkiller were considerably less than the 56% reported by Sofaer(1984). No nurse thought the patient ought to be responsible for their own pain relief, (see table 88) yet by not assessing pain they forced this responsibility on the patient. On the second postoperative day, 65.22% of painkillers were given on the drug round, although only 17.86% of nurses said they would see if a painkillers was needed at this time. This nurses question referred to a narcotic drug, but as all patients were prescribed a narcotic on this day, it was felt comparisons between projected and actual behaviour on this day were justified. This suggested that what the nurses said they would do and what they actually did may not have been the same. Support was lent to this argument

by the 10.71% of nurses who said they would always give a PRN narcotic every three to four hours on the second postoperative day. No evidence was found to suggest this was done in practice. Similar differences emerged when what nurses said they would do on day 2 was compared to what patients reported happened on that day. Although 39.28% of nurses said they would see if a painkiller was needed every three to four hours, 19.56% patients said a painkiller was suggested by the nurse, (see table 99). This suggested the nurses were either not checking, or if they were, the patient was unaware of this assessment. The subjective impression formed by the researcher was that pain, at best, was rarely assessed every three or four hours. This discrepancy between what nurses said and did could have been due to a number of reasons, including pressure of work, short staffing problems and that pain relief was not allocated a high priority in their care.

The factors nurses took into account when giving a narcotic with a flexible time and dose interval were assessed. One nurse refused to answer this, or the following question, on the grounds they were 'stupid questions'.

Table 85 - RESPONSES TO "PLEASE LIST ANY FACTORS YOU CONSIDER WHEN GIVING A PRN NARCOTIC ANALGESIC WHEN A FLEXIBLE DOSE AND TIME INTERVAL (eg. Pethidine 50-100mg 3-6 hourly) HAVE BEEN PRESCRIBED"*

FACTOR	Number of Responses**
Pain	13
Number of Postoperative Days	9
Type of Operation	9
Effectiveness of Previous Analgesia	8
Patient's Observations	7
Time Since Last Injection	4
Alertness	4
Age	4
Weight/Size	4
Medical Condition of Patient	4
Pain Threshold	3
Size of Last Dose Given	3
Is Patient a Clockwatcher	2
Any Imminent Activity	2
Other ***	14

* - Adapted from Cohen(1980).

** - All responses were used, not just their first as Short(1979) and Sofaer(1984) had done.

*** - Other factor, each mentioned only once.

This table showed the diversity of factors considered by nurses when making this decision. Pain was the most often mentioned consideration; by 13/28 nurses. Number of days since the operation and the type of surgery were also seen as important by 9/28 nurses.

Comments on table 85: whilst about half the nurses did consider pain as a factor in making this decision, the other half did not, or if they did, they did not articulate this. That the type of operation and number of days since surgery were frequently considered suggested stereotypic expectations of pain. The type of operation may have been seen as legitimising a certain amount of pain, and Davitz & Davitz(1981) found the patients' illness was one of the most important determinants of nurses inferences of the patients suffering. The time since surgery could also have been regarded as

legitimising certain pain levels if pain assessment was not individualised. This had implications for whether pain outside 'expected' amounts (expected by the nurse at least), was 'real'. Strauss et al(1974) maintained that if an unexpected pain trajectory occurred, nurses were unable to cope with it, and the patient was often labelled 'difficult' or 'uncooperative'. Also, if the reality of the patients pain was questioned, this had further implications in terms of suggesting the patient was malingering or perhaps addicted to the painkiller. McCaffery(1979) suggested that if a patient was a 'clockwatcher' and demanded painkillers, this was more likely to be a reflection of inadequate pain relief rather than of a malingering, addicted patient. If a patient's pain was well controlled and they knew they could have another painkiller when necessary, they would be less likely to crave painkillers and 'clockwatch'. The use of general trends on which to base one's actions inevitably form part of practice and can form a useful baseline, but not to the neglection of individual pain assessment. Table 62 and the subsequent results using raw scores, showed there was no basis for characterising the patients pain purely by diagnosis, other than on the basis of an 'average' patient. The variation from this average suggested that a proportion of patients would receive inappropriate pain relief, in whatever direction, if averages only were applied. The average rule might apply to some patients, but others would be over or under treated as a result.

The effectiveness of previous analgesics was considered when making decisions about narcotic pain relief by eight nurses. This suggested some assessment of pain took place, although this was not specifically mentioned. The patients observations, presumably of respiration and blood pressure, were seen as factors to consider by seven nurses. This indicated a possible concern over hypotension and respiratory depression. However, pain is a powerful anatagonist to these effects and Cohen(1980) concluded that they tended to be over-estimated by nurses.

Nurses were then asked to list factors they considered when deciding whether to give a narcotic or non-narcotic analgesic.

Table 86 - RESPONSES TO "PLEASE LIST ANY FACTORS YOU CONSIDER WHEN DECIDING WHETHER TO GIVE THE POSTOPERATIVE PATIENT A NARCOTIC OR NON-NARCOTIC ANALGESIC"

FACTOR	NUMBER OF RESPONSES*
Number of Postoperative Days	15
Pain	15
Type of Operation	9
Patient's Observations	8
Time of Last Injection	4
Addiction	4
What Analgesic Has Been Given Before	4
Effect of Previous Analgesic	2
Does Patient Prefer Oral or IM	2
Alertness	2
Is Patient Nil By Mouth	2
Type of Pain	2
Other **	11

* - All responses, not just the first, are listed.

** - Other factors, each mentioned only once.

The amount of pain and number of days since surgery were both seen as important by 15/28 nurses in making this decision.

Comments on table 86: over half the nurses mentioned pain, and the same number took the number of days since surgery into account. This reinforced the findings from the previous question and suggested that whilst the amount of pain was seen as important, the pattern of this pain over time was equally important. This again raised the question of the fate of the 'deviant' patient who did not follow the usual pattern. As before, type of operation and patient observations were seen as important. That nurses considered the type of drug last administered may have indicated they did not always exercise their own professional judgement when considering pain relief.

One factor which was not specifically mentioned but which may have

influenced the decision to give a narcotic or non-narcotic analgesic was the time necessary to administer a narcotic analgesic. Narcotic analgesics are subject to the Misuse of Drugs Act, Great Britain. Parliment(1971), and The Misuse of Drugs Regulations, Great Britain. Statutory Instrument(1973a, 1973b), and are known as controlled drugs. There may also be additional local hospital regualtions governing their use. Controlled drugs must be prescribed by a doctor, be kept in a separate locked cupboard, the keys to which are carried by the ward sister or her deputy. A record of stock and its use is kept, and two nurses, one qualified, must check the drug, witness its administration and sign the record book, recording time, date, patient, dose and the balance of drug stock. In the present hospital, because enrolled nurses were not allowed to administer controlled drugs, a registered nurse had to be located and asked to come and give the drug. This could at times cause difficulties. For example, when ward rounds were in operation, the registered nurse may or may not have felt able to leave the round to supervise the administration of a controlled drug.

Non-narcotic analgesics were also prescribed by a doctor and kept in a locked cupboard or trolley. A record of stock did not have to be kept on the ward, and two nurses, one a registered, enrolled or third year student nurse who had passed the drug assessment, checked the drug and initialled the appropriate drug card. Thus administration was more straightforward, less time consuming and a greater number of staff were able to give the drug.

Although only four nurses mentioned addiction as a factor they would consider, table 87 showed nurses responses when they were specifically asked about addiction.

Table 87 - RESPONSES TO "IF AN OTHERWISE HEALTHY POSTOPERATIVE PATIENT RECEIVED PETHIDINE 100mg 4 HOURLY FOR SEVERE PAIN FOR ONE WEEK, DO YOU THINK THEY RISK BECOMING ADDICTED TO THE PETHIDINE?"*

ALTERNATIVES	%	n
Almost Never	14.28	4
Sometimes	46.43	13
Often	32.14	9
Almost Always	7.14	2
Don't Know	0.00	0
TOTAL	99.99	28

* Adapted from Cohen(1980)

Five nurses commented that this risk would vary with the patient.

Comments on table 87: concern over addiction to narcotic analgesics was expressed by some nurses. Table 87 indicated 85.7% of nurses overestimated the risk of addiction (46.43+32.14+7.14), if the findings of Porter & Jick(1980) were applied to surgical patients. The comments suggested some patients were more likely than others to become addicted.

With all the variety of factors considered by the nurse in deciding to give a painkiller, to what extent was the patient involved in the relief of their pain? The nurses perceptions of responsibility for pain relief were examined and results were presented in table 88.

Table 88 - RESPONSES TO "WHO DO YOU THINK OUGHT TO BE RESPONSIBLE FOR A PATIENT'S POSTOPERATIVE PAIN RELIEF?"

ALTERNATIVES	%	n
Doctor	14.28	4
Nurse	39.28	11
Patient	0.00	0
Doctor/Nurse/Patient	25.00	7
Doctor/Nurse	17.85	5
Doctor/Nurse/Patient/Physiotherapist	3.57	1
TOTAL	99.98	28

Comments included 'The nurse is with the patient and can observe them'(n=7), and 'It is the nurses responsibility to see they (painkillers) are correctly administered'(n=2). There was a slightly different response to this question from enrolled and registered staff, as table 89 showed.

Table 89 - DIFFERENCES BETWEEN ENROLLED AND REGISTERED NURSE RESPONSES IN TABLE 88

RESPONSE	ENROLLED n	REGISTERED n
Doctor	4	0
Nurse	2	9
Patient	0	0
Doctor/Nurse/Patient	1	6
Doctor/Nurse	2	3
Doctor/Nurse/Patient/Physiotherapist	1	0

Registered nurses regarded themselves as responsible for pain relief, or viewed it as a team effort, whilst enrolled nurses saw the doctor as being more responsible for pain relief than themselves as individuals. They tended to be less likely to include the patient in this responsibility.

Comments on tables 88 and 89: no nurse felt the patient should be totally responsible, despite 17.86% who said that on the second postoperative day they would wait for the patient to ask for a painkiller. There was a different attitude between registered and enrolled nurses over who should be responsible for pain relief. No registered nurse, compared to four enrolled nurses, felt the doctor should be solely responsible. Perhaps the enrolled nurse did not see pain control as part of their role, or at least did not feel accountable for it. That enrolled nurses were not allowed to administer controlled drugs at this hospital may have been related to this attitude. This was supported by only two enrolled compared to nine registered nurses who felt nurses should be solely responsible for pain relief. The nurse/patient/doctor team was seen as jointly responsible for pain relief by six registered and two enrolled

nurses. Three registered and two enrolled nurses viewed the doctor and nurse only as responsible.

Were nurses constrained by the doctors prescribing habits?

Table 90 - RESPONSES TO "IN GENERAL, ARE YOU SATISFIED WITH THE WAY POSTOPERATIVE ANALGESICS ARE WRITTEN UP BY THE DOCTORS?"

ALTERNATIVES	%	n
Yes	32.14	9
No	17.86	5
It Varies	50.00	14
TOTAL	100.00	28

Comments included 'It varies with the doctor and their experience'(n=4) and 'You usually have to ask for oral analgesics'(n=3).

Comments on table 90: only 17.86% of nurses were dissatisfied with the way in which doctors prescribed analgesics, although 50% felt this varied. This, together with the finding most PRN drugs were given at more than the minimum time interval, suggested that whilst prescriptions were sometimes imperfect, they may well have been adequate if used in relation to patient need by the nurse.

As a final question nurses were asked if they would like any more information about pain relief. All the 28 nurses said they would. One nurse commented, "The doctors tend to be as much in the dark about pain relief as we are." Other comments included 'Information on drugs and their actions would be helpful'(n=3) and 'It would be useful for newly qualified staff/students to have a study day on pain'(n=2). Twelve registered nurses would have liked a study day, compared to 3 enrolled nurses, whilst preferences for fact sheets or videos were equally divided between the two groups.

b) Patient

Before surgery, patients were asked a question concerning their feelings about taking painkillers. The responses to this question, presented in table 91, gave a rough indication of patients' attitudes to painkillers.

Table 91 - PATIENTS' FEELINGS ABOUT TAKING PAINKILLERS

RESPONSES	%	n
Don't Like Taking Them	37.5	30
Only Take if Bad	40.0	32
Don't Mind Taking Them	22.5	18
TOTAL	100.0	80

Thus 77.5% (40+37.5) of patients did not like taking painkillers or would only take them if the pain was bad. The implications of this have been discussed on page 191.

During their last interview, patients were asked 'How did you feel your pain was controlled overall? Responses to this question are presented in table 92.

Table 92 - PATIENTS' PERCEPTIONS OF THEIR PAIN CONTROL

RESPONSES	%	n*
Better Than Expected/Very Well	45.5	35
As Expected/O.K.	15.6	12
Worse Than Expected/Badly	18.2	14
Variable	18.2	14
Other Response	2.5	2
TOTAL	100.0	77

* - 3 patient responses unavailable

Comments on table 92: over 61% (45.5+15.6) seemed to have had adequate pain control. One patient, who had been encouraged by a nurse to have

narcotic injections, remarked she thought the nurse had wanted practice giving injections. However, still looking back on their stay, 32.5% of patients felt they had been unable to have a painkiller when they wanted one. One gentleman said, "I was nearly crying with the pain - all those hours I waited: the nurse said they were waiting for the doctor to sign it up. I nearly put my clothes on and walked out." Another patient commented, "A painkiller was got under protest sometimes - you had to exert yourself and be stubborn." One younger patient said, "Pain was the biggest shock of my life. If I'd known how much pain I'd have, I would have brought my own painkillers." Patients commented they could only get painkillers at fixed times, or they could not always get one. The mean number of analgesic doses per patient per day are presented in table 93.

Table 93 - MEAN NUMBER OF ANALGESIC DOSES PER DAY

DAY	MEAN NUMBER OF DOSES	STANDARD DEVIATION
OP.	2.00	0.99
1	3.15	1.28
2	2.45	1.35
3	1.89	1.34
4	1.77	1.32
5	1.53	1.23
6	1.19	1.31
7	0.64	0.75

On average, 29% of patients wanted another painkiller when they were questioned during the study. One patient remarked, "It's not their way to give it; they let you soldier on." An elderly lady said, "I wanted another painkiller - I asked but they wouldn't give me one. I don't know why - because they don't care I suppose."

Table 94 - THOSE PATIENTS WANTING ANOTHER PAINKILLER WHEN QUESTIONED

DAY	%	n*	NUMBER OF PATIENTS QUESTIONED
1	35.51	24.5	69
2	41.55	29.5	71
3	36.80	26.5	72
4	35.00	24.5	70
5	20.42	14.5	71
6	14.81	10.0	67.5
7	18.70	13.0	69.5
MEAN	28.97		

* - Half numbers occur because numbers refer to the daily averages of two scores.

The percentages were at their highest during the first four days after surgery. The numbers of patients who wanted a painkiller in the night but did not receive one were outlined in table 95.

Table 95 - THOSE PATIENTS WANTING ANOTHER PAINKILLER IN THE NIGHT

NIGHT	%	n	NUMBER OF PATIENTS QUESTIONED
1	13.5	10	74
2	18.7	14	75
3	21.3	16	75
4	19.4	14	72
5	8.2	6	73
6	2.7	2	73
7	5.7	4	70
MEAN	12.78		

Comments on table 95: this illustrated that the number of patients who did not get a painkiller during the night when they wanted one was at its highest on the third night after surgery. However, these night time scores were lower than those reported during the day. This indicated pain relief at night did not appear to be a particular problem.

Misunderstandings over pain relief were illustrated by one nurse who

commented, "The patient needed an analgesic and after two hours wanted more. She didn't know she could only have them four hourly - we can't keep on giving them to her."

These differences between what the patients wanted and what they received were further illuminated by a breakdown of type of painkillers administered. Painkillers were divided into narcotic, non-narcotic, both narcotic and non-narcotic and neither narcotic or non-narcotic: no painkiller.

Table 96 - TYPE OF PAINKILLER ADMINISTERED AFTER SURGERY*

DAY	NARCOTIC** %	NON-NARCOTIC %	BOTH %	NO PAINKILLER %
OP.	95.0	0.0	0.0	5.0
1	85.0	5.0	6.3	3.8
2	61.3	7.5	22.5	8.7
3	48.1	31.6	5.1	15.2
4	37.7	33.8	9.1	19.5
5	30.3	31.6	11.8	26.3
6	18.4	34.2	6.6	40.8
7	18.9	27.0	2.7	51.4

* - Adjusted to exclude patients who had been discharged

** - This included patients having sublingual buprenorphine. The numbers of patients who had only intramuscular (IM) narcotics are shown below.

Table 97 - NUMBERS OF PATIENTS HAVING IM POSTOPERATIVE PAINKILLERS

DAY	n	TOTAL NUMBER OF PATIENTS REMAINING IN THE SAMPLE
OP.	74	80
1	71	80
2	56	80
3	22	77
4	14	76
5	8	76
6	2	73
7	1	69

These two tables showed there was a marked drop in the number of intramuscular narcotics administered between the second and third day after surgery, and a marked rise in non-narcotics. One patient said, "The nurse see it as their duty to move you onto a lower grade painkiller." Another commented, "I was put down for an injection and it would have helped, but they kept me off it - it must have been too strong." All but two of the 80 patients were presribed IM narcotics, (these two had intravenous narcotic prescriptions because of clotting problems), and this IM prescription was renewed after 72 hours for 19 of these 78 patients. Sublingual buprenorphine was also prescribed for 36 patients, either when the IM prescription expired, or before this time.

Comments on tables 96 and 97: the number of narcotic painkillers given on the third day after surgery dropped and the number of non-narcotics rose. The third postoperative day was the day on which controlled drug prescriptions expired unless they had been actively renewed. This may have contributed to the marked drop in narcotic administration at this time. There was no concomitant drop in pain scores on this day, thus it seemed time rather than pain score was a more important consideration when changing from narcotic to non-narcotic analgesics. There were mixtures of narcotic and non-narcotic drugs given on the second day after surgery. This could have suggested an attempt was made to manage different types of pain with different analgesics. However, after this day, the use of combinations of the two markedly declined,

which suggested non-narcotics were given in preference to narcotics, rather than to complement their effect. Patients often remarked they were having injections for pain because they were 'Nil By Mouth'.

This contention was supported by the factors nurses took into consideration when deciding to give a narcotic analgesic. Nearly half the nurses mentioned pain as a factor in this decision, but the number of days since surgery and the type of operation were the next most frequently mentioned factors. There was a slight rise in mean pain scores on the third day, which again suggested pain was not a major factor in the decision to stop narcotic painkillers. This rise in pain scores could also be interpreted as a result of having less potent painkillers. It seemed narcotic analgesics were dicontinued as quickly as possible. The reasons for this included fear of addiction. One nurse said, "We're weaning him off it." This suggested the patient was already addicted to the painkiller.

When patients did get a painkiller, the effect was not necessarily good pain relief, as table 98 illustrated.

Table 98 - THE EFFECTIVENESS OF PAINKILLERS

DAY	EFFECT OF PAINKILLERS*					
	SLIGHTLY BETTER OR LESS		BETWEEN SLIGHTLY AND VERY MUCH BETTER		VERY MUCH BETTER OR MORE	
	%	n	%	n	%	n
1	25.00	11.5	46.74	21.5	28.26	13.0
2	25.61	10.5	39.02	16.0	35.36	14.5
3	31.88	11.0	42.03	14.5	26.09	9.0
4	40.74	11.0	25.92	7.0	33.33	9.0
5	44.44	12.0	31.48	8.5	24.07	6.5
6	56.82	12.5	18.18	4.0	25.00	5.5
7	44.44	8.0	36.11	6.5	19.44	3.5
Mean	38.42		34.21		27.36	

* - Half numbers occur because numbers refer to a daily average of two scores.

Note the fall in the percentage of painkillers making the pain very much better on the third postoperative day. Painkillers were thus making the pain only slightly better in at least a quarter of patients, and this increased to around half towards the later postoperative days. One patient said "Painkillers aren't very effective, it's mostly a question of waiting." and, "It'll go away in the end, you just have to sit it out." However, painkillers could be effective, another patient said "I felt so much better yesterday after 2 temgesic - I couldn't believe it. I told the doctor and he said 'You'd be suprised how many people say that.' It made all the difference." Although painkillers could be effective, this effect did not always last, "Painkillers last a couple of hours, so you've got to wait another two. Yet if you get two hours you're not doing badly, 2-3 hours is a God send and a blessing." Another patient commented, "After the jab the pain subsides and its blissful, but it soon comes back."

Comments on table 98: since the numbers of patients taking painkillers and thus rating pain relief were quite low, all these results should be interpreted with caution. That the effectiveness of painkillers decreased with time was interesting. Perhaps those still taking painkillers on the later postoperative days were in worse pain than those not taking painkillers. Some patients remarked they often did not take painkillers in the later postoperative days, as they did not make much difference. This suggested not only were the painkillers different, but also that the pain was different from that experienced on earlier postoperative days and perhaps not amenable to purely analgesic treatment. Some patients remarked they would like to have been told such pains were normal, one man said, "The nurses don't really know about it. They're not prepared to give advice on what to expect."

As painkillers were less effective with time, perhaps the later postoperative days were a time when alternative methods of pain relief could be utilised. It may be difficult for all patients to accept methods other than painkillers, however, this acceptance would be influenced by the nurses

and doctors presentation, both verbal and non-verbal, of these methods.

Although 95% of painkillers were prescribed PRN, most were given on the drug round. (The 5% which were prescribed reguarly consisted of two patients who had indomethacin suppositories for pain relief on a regular basis as well as PRN IM narcotics, and the two patients already mentioned having intravenous narcotics).

Table 99 - THE SOURCE OF PAINKILLERS (all days)*

SOURCE	ALL DAYS		DAY 2 ONLY**	
	%	n	%	n
Drug Round	66.39	320	65.22	30.0
Patient Asked	7.88	100	9.78	4.5
Nurse Suggested	20.74	38	19.56	9.0
Other***	4.98	24	5.43	2.5

* - These numbers are different from those rating pain relief since an indication of source of painkiller could be made by those who were too unwell to rate pain relief

** - Day 2 included to allow direct comparison with a nurses question. Half numbers occur as numbers refer to a daily average of two scores.

*** - Usually physiotherapist requested.

The reliance on the drug round was supported one patient who said, "I missed painkillers from the trolley as I was in the loo - its my own fault really." However, if pain relief was inadequate, patients rarely blamed the nurses - one said, "I wouldn't go through all that pain again, everyone is very kind, it's just the pain."

Comments on table 99: the PRN basis for pain control was another area which may have contributed to inadequate pain relief. An 'as necessary' regime would seem ideal for postoperative patients with changing levels of pain, as pain relief could be titrated to meet the individual's needs. However, for this to work, needs must be assessed and PRN painkillers actually given 'as necessary', and not interpreted, as Mather & Mackie(1983) concluded,

to mean "as little as possible." A PRN prescription potentially gave the nurse enormous scope for assessing the patients pain and providing adequate relief. However, any interpretation of PRN orders to mean 'as little as possible', whether through fear of addiction or for some other reason, only served to diminish the nurses role in relation to pain relief, and may have indicated a lack of willingness to accept responsibility for pain relief. Furthermore, although 95% of painkillers were prescribed PRN, 66% were given on the drug round, this suggested painkillers were not always given 'as required' but 'as suits the nurse.' Some patients needs may not have been met by this regime, and the numbers of patients wanting another painkiller when questioned suggested this was indeed the case. If pain happened to coincide with the frequency and timing of drug rounds, then pain control might be adequate. If patients had more pain, or pain at different times, then pain control would be inadequate. If the patient needed painkillers less frequently, the effect of being asked 'Anything for pain?' varied with the patient. Some patients saw this as concern, whilst one retorted, "Don't they know I haven't had one for days?"

4.14 Sedatives and Antiemetics

Sedatives, excluding night sedation, were only administered to 5% of patients. Those given sedatives had a mean of 1.45 doses. Anti-emetics were administered to 78.7% of patients, who received a mean of 3.77 doses, and 90% had 6 doses or less. Antiemetics were often given routinely with IM analgesics, and thus not necessarily for nausea.

Comments: antiemetics are sometimes used in studies as a measure of recovery. However, they were often given routinely with narcotic analgesics, whether patients felt sick or not, so their use as a separate indicator would be of doubtful validity. Because of the infrequent administration of sedatives and the mixed reasons for giving antiemetics, they were not used in further analysis.

4.15 Night Sedation

Table 100 - PATIENTS WHO HAD NIGHT SEDATION*

NIGHT	HAD SEDATION		NO SEDATION	
	%	n	%	n
1	6.2	5	93.8	75
2	11.3	9	88.7	71
3	17.5	14	82.5	66
4	35.1	27	64.9	50
5	40.8	31	59.2	45
6	43.4	33	56.6	43
7	45.8	33	54.2	39

* Adjusted to exclude patients who had been discharged.

Comments on table 100: night sedation was given to only 6.2% of patients on their first postoperative night. Many patients remarked they would have liked a sleeping tablet, but could not have one as they were 'nil by mouth'. However, a narcotic painkiller may have acted partly as a sedative at this time: indeed, patients sometimes commented that the injections helped them to relax. This effect could have been due not only to sedation, but also to a reduction in pain. The numbers of patients who had night sedation risen to 45.8% by the seventh postoperative night.

4.16 Sleep Disturbance

Night sedation was positively correlated with the percentage of patients having undisturbed nights: the more patients who had night sedation, the higher the percentage who had an undisturbed nights sleep, $r_s = +0.99$ $p < 0.001$

Table 101 - PATIENTS WHO HAD DISTURBANCE OF SLEEP*

	NO DISTURBANCE		DISTURBANCE DUE PAIN		DISTURBANCE DUE OTHER**		TOTAL DISTURBANCE	
	%	n	%	n	%	n	%	n
1	7.8	6	66.3	41	26.0	20	92.3	61
2	13.0	10	55.9	33	31.2	24	87.1	57
3	24.1	19	39.2	31	36.8	29	76.0	60
4	30.1	22	42.5	31	27.3	20	69.8	51
5	42.1	32	34.2	26	23.6	28	57.8	44
6	44.0	33	24.0	18	28.0	21	52.0	39
7	45.8	33	18.1	13	36.2	26	54.3	39

* - Adjusted to exclude missing data

** - Other included disturbed by nurse, other patients or by noise.

Comments on table 101: over half the patients questioned had their sleep disturbed by pain on the first two nights, and around a third on the next three nights. However, other disturbances were influential too, such as other patients moaning and nurses making a noise. On the first night after surgery, 61 of the 67 patients questioned were disturbed. This gradually decreased, although over half still had disturbed nights on the seventh night after surgery. This was bound, at least, not to help the patient regain their strength. Future work could look at the extent to which sleep disturbance affected other variables. This was not undertaken here, as the degree of disturbance would make this analysis more useful. In this study, whether sleep was actually disturbed for five minutes or all night, that the patient felt their sleep was disturbed (and thus usually did not feel rested) was important. If an 'objective' test of time asleep had been carried out it may well not have correlated with the patients interpretation, but it was the patient's feelings that were deemed important here.

4.17 PAIN RELIEVING STRATEGIES

The final section of the results considers the analysis of the fourth aim of the study: to identify any pain relieving strategies used by the patient or the nurse.

This will be presented from the patients' and then the nurses' perspective.

a) Patient Strategies

Patients were asked an open ended question postoperatively about what they did at home if they had any pain. They had a variety of pain relieving strategies.

Table 102 - PATIENTS' PAIN RELIEVING STRATEGIES AT HOME

STRATEGY	%	n
Tablets	38.7	31
Put up with it	16.2	13
Don't have pain	11.2	9
Tablets and Rest	7.5	6
Rest	6.3	5
Other*	20.1	16
TOTAL	100.0	80

*Other - strategies with less than 10 responses, not coded separately.

Comments on table 102: patients' pain relieving strategies at home were varied. Although a large proportion relied purely on tablets for relief of pain, that the most common category after 'tablets' was 'other' indicated strategies at home were diverse and individual.

In hospital, this range was reduced. Patients were asked at their last interview, 'Did you know what to do of you had pain? What?' 88.6% felt they knew what to do, 11.4% felt they did not. The strategies of these 88.6% were listed in table 103.

Table 103 - PATIENTS PAIN RELIEVING STRATEGIES IN HOSPITAL

STRATEGY	%	n*
Ring for nurse	45.6	36
Take a painkiller	24.0	19
Put up with it	6.3	5
Do something myself	5.0	4
Other**	7.6	6
Didn't know what to do	11.4	9
TOTAL	99.9	79

* - One response missing

** - Other included stategies with less than 5 responses, not coded separately.

Comments on table 103: nearly 70% (45.6+24.0) of patients rang for the nurse or took a painkiller for pain. This implied the patient assumed a rather passive role in pain relief. It could be argued that postoperative pain was more intense than any pain experienced at home, so an increase in the numbers relying on painkillers was to be expected.

Patients were more specifically asked, twice a day, if anything made the pain better. Table 104 portrayed the distribution of the 799 responses to this question.

Table 104 - RESPONSES TO "DOES ANYTHING MAKE THE PAIN BETTER?"

STRATEGY	%	n
Drugs	38.80	310
Nothing	28.53	228
Keeping Still	8.88	71
Specific Position	5.38	43
Physical Support	1.63	13
Rest	1.37	11
Other*	15.39	123
TOTAL	99.98	799

*Other - 10 responses or less. These included combinations of

responses and distraction(9), drugs and keeping still(9), Moving(9), Don't Know(7), Pressure(7), Relaxation(6), Physical Support and Pressure(5), Drugs and Specific Position(3) and Warmth(2). One patient commented, "It's crucial to have something to take your mind off the pain."

Comments on table 104: the percentage of occasions on which the patient felt 'nothing' made the pain better was of concern. The extent to which this would have engendered feelings of helplessness and lack of control was not specifically assessed. That 11.4% of patients felt they did not know what to do if they had pain supported this passive role with minimal patient control. A minority of patients used more active strategies, such as distraction or pressure, but these were usually patient initiated.

At the final interview, patients were asked "Was there anything in particular which made you more comfortable?" It was hoped this would elicit any alternative methods of pain relief. Whilst 25.3% said there was nothing in particular which had made them more comfortable, 74.7% said there was. Any comments made by more than one patient are listed in table 105.

Table 105 - FACTORS WHICH INCREASED PATIENT COMFORT

FACTOR	%	n*
Getting Better	15.2	12
'Lots of Things'	10.1	8
Nice Atmosphere	6.3	5
Researcher	2.5	2
Visitors	2.5	2
Adjusting Bedding	2.5	2
Other**	35.4	28
Nothing	25.3	20
TOTAL	99.8	79

* - One response missing

** - Other included more than one response, or responses made by only one patient. None of the reponses included specific pain relieving measures other

than painkillers.

The next table illustrated additional information patients would have liked before surgery. It was thought some mention of pain and its relief might have been made.

Table 106 - RESPONSES TO "IS THERE ANYTHING YOU WOULD LIKE TO HAVE KNOWN BEFORE YOUR OPERATION?"

RESPONSE	%	n*
No	53.2	41
Glad did not know	16.9	13
Didn't know anything	9.1	7
Would have liked more details	6.5	5
Other**	14.3	11
TOTAL	100.0	77

* - Three responses missing

** - Specific to the patient

This table showed 70.1% (53.2+16.9) of patients questioned did not want additional information. Pain and its relief did not feature in this list.

b) Nurses Strategies

Trained nurses on the wards were asked "What might you do if a patient reported pain, but it wasn't time for them to have another painkiller for an hour?" All responses made by the nurse were recorded. There were 42 responses which involved the doctor: telling the doctor, recommending a different analgesic, an increased dose or a decreased time interval. Six responses involved making the patient comfortable. Four involved talking to the patient and reassuring them, and four involved telling the patient they were unable to have another painkiller.

Comments: this indicated responses were mainly directed towards painkillers, the nurses' use of non-invasive methods of pain relief, such as relaxation and distraction, were minimal, no nurse specifically mentioned any

such method, and none was observed during the course of the study. This supported Graffam(1981), who found, "additional relief measures which might have been used were not observed or reported." p14.

4.18 LIMITATIONS OF THE STUDY AND PROBLEMS ENCOUNTERED

4.18.1 Sample

Only adult patients undergoing elective abdominal surgery were included in the sample. The extent to which the present findings would apply to other patients groups, those admitted as an emergency, or to children is unclear.

The sample was one of convenience and not a random sample. The findings of this study cannot, therefore be generalised beyond the sample studied. The present findings applied to this particular group of patients with these particular nurses in this particular hospital at this time. However, it may be, from the description of the sample and the hospital, that these findings are deemed likely to apply to other similar situations.

A sample size of 80 paients could have been larger, given the inevitable missing values in a study of this nature. This missing data may have reduced the representativeness of the data for this sample.

4.18.2 Analysis

It could be argued this study results should have been analysed using multiple analysis of variance, factor analysis or stepwise multiple regression. However, as already discussed this analysis was not seen as appropriate for the type of data obtained in the study. Furthermore, for example, when Taenzer et al(1986) used stepwise multiple regression, to simplify the analysis, the pain scores were averaged across the postoperative period. Thus for the sake of using a more sophistocated analysis, the richness of the data was destroyed, and quite possibly the score remaining was fairly meaningless, especially to the patient, as this 'average' pain might never have actually been experienced.

4.18.3 Tools

All the tools used in this study relied to some degree on patient

ratings. When presenting outcome data this must be listed as a limitation, because it relied totally on the patients honesty. Honesty was encouraged by building a rapport with the patient and emphasising the confidential nature of the responses. Patients were also specifically asked to be as honest as possible. Whether patients ratings were accepted at face value necessarily depended on whether the patient was believed. This study was based on the premise that the patient was believed. The extent to which response sets or social desirability influenced these patient ratings was unknown.

Since knowledge about each variable was probably incomplete, there may have been facets of the variables which were not assessed. The findings of this study should thus be regarded as applying to 'pain as assessed by the verbal rating scale', 'anxiety as assessed by the State Trait Anxiety Inventory' and 'recovery as assessed by the patients' own rating and by the recovery inventory'.

a) Patients Ratings of Pain

These ratings were taken at face value and may have represented what the patient chose to communicate. Pain ratings were limited in several ways. First, only pain intensity was assessed, perhaps oversimplifying pain. However, given the constraints of working with ill patients, and the view that the affective component of pain may be weighted more heavily than the sensory component in a verbal rating scale, Syrjala & Chapman(1986), it was felt this scale was acceptable and adequate. Lack of sensitivity of the verbal rating scale has been debated, but a scale all patients could understand and easily complete was essential. Another criticism of the verbal rating scale was that comparisons between patients are meaningless where each patient's definition of the adjectives was potentially different. However, in this study, if the patient felt the pain was 'very bad', this was what mattered.

It could be argued that denial of pain is usual in British society and any results represented a conservative estimate of pain. Ratings of pain

could imply criticisms of the doctors and nurses, and for this reason may have been underreported. Even if the patient was encouraged to be as honest as possible, these influences may have operated sub-consiously and influenced the results. However, the full range of responses from individuals on the pain scale suggested this was not the case.

Asking patients about their pain twice a day may have over or under-represented overall pain for that day. Patients could have been asked to give a retrospective 'average' pain rating per day, as they were by Sofaer(1984). However, this would have presented its own problems. If the patient was asked to make the rating at the last visit or in the evening, there was the possibility of them experiencing more pain after the rating had been made. If the rating was made the following day, problems over memory of the pain would arise. Furthermore, the extent to which a patient could actually produce such an 'average' rating was unknown. The validity of such a rating would be difficult to determine. Decisions would also have to be made over whether such a rating should include pain on movement as well as pain at rest. No pain ratings were made of pain experienced overnight. A possible solution would have been to ask the patient to make an 'average' rating the following morning, with all the attendant problems of this, just outlined.

It was possible that asking patients about their pain sensitised them to this pain, and made their postoperative stay more uncomfortable than it might otherwise have been. Conversely, the distraction of an interview may have produced the opposite effect. The extent to which either of these factors operated would only be speculation.

It could be argued that assessing patients pain at varying times over the day meant trajectories of pain could not reliably be plotted, because of this time variation. However, it was felt that because painkillers were usually given on the drug rounds, which were at fairly fixed times, always asking the patient about their pain when a painkiller was having perhaps its

minimum or maximum effect would not produce an accurate record of the patients pain. No assessment was made of information patients possessed before surgery or how this affected pain.

b) Nurses Ratings of Pain

The extent to which it was reasonable to ask the nurse about the patients pain was debatable, especially since the study was based on the patient being the best judge of their pain. However, if the nurse did not know how much pain the patient experienced, pain relief was unlikely to be adequate. Greenwood(1984) contends an isolated nursing act is meaningless. The context determines the motivation as nursing is comprised of people, action and interaction and is thus a social phenomenon. It was hoped this criticism was to some degree countered by including a discussion of the organisational influences on pain and accountability of actions. However, no systematic study of the context in which the ratings were made was undertaken, and any teaching the nurses may have received on pain and its relief was not assessed.

c) Pain Relief

The arguments which applied to the pain scale applied equally to the pain relief scale. In addition, at times, the low numbers completing this scale because they had not received a painkiller, demanded very cautious interpretation of the results. However, if painkillers were not administered then pain relief from them could obviously not be assessed. Unless current frequency of analgesic administration changed, it seemed unlikely that the situation would improve.

d) Recovery

Both the recovery inventory and self ratings of recovery only looked at short term recovery. It was recognised that only part of the process of

recovery had been investigated, and it could not be assumed what represented 'good' recovery in the short term would necessarily be 'good' recovery in the long term.

i) Recovery Inventory

The main problem with this inventory was the assumption of equal importance of each item in the total score, as already discussed.

The categories could have been added of 'walk out to the toilet' and 'walk out of the ward' with the aid of a nurse rather than just unaided. Although this may have made the recovery inventory more sensitive, it would have brought in the addition variable of the availability of a nurse. Whilst a patient may have been able to mobilise with the aid of a nurse, this may not have occurred because no nurse was available.

The binomial scoring of the inventory could be criticised, rather than a six point scale used by Wolfer & Davis(1970) and Johnston(1978). However, since there were 22 different indicators of recovery, this would have meant considerably more scales for the patient to rate, rather than just answering questions with a yes/no answer. Also, the extent to which a patient could actually rate, for example, passing urine on a six point scale from very poor to excellent was open to debate. Another issue the binomial scoring raised was pointed out by Shacham & Daut(1981). They argued that if a yes/no classification of scoring was used, scores would be higher if patients exhibited a variety of indicators rather than one with greater intensity. Assumptions should therefore be limited to variety and not include degree. This point also tied in with the argument over the weighting of items. It was not felt that purely by using six point scales could this problem of the importance of each item be overcome. Whilst a six point rating may have reduced the apparent extent of this weighting argument, it would not really tackle the fundemental issue on which it was based: one of the importance of each item to overall recovery. Scoring procedures also

raised a further issue. Converting the recovery inventory score into a percentage was perhaps not fully justified. Initially this was done to facilitate comparisons with the self ratings of recovery, but a score of between 0 and 22 could have been used. This conversion to a percentage score may have artifically augmented or reduced scores. For example, if the patient was asleep or too ill to answer the recovery inventory items, this data would have been recorded as missing. However, items such as drinking fluids or walking out of the ward could be filled in by the researcher. Thus if a patient scored 16/17 items (responses to the other five items being unobtainable), they scored 94%. However, had the patient been able to answer the questions and scored 0 on all the missing items, the 16/22 recovery inventory score would have been 73%, somewhat lower than 94%. If percentages were to be used, it might have been better to exclude the entire recovery inventory as missing data on these occasions, rather than using a pro rata score. It would not have been appropriate to calculate a likely score for the missing items from those which had been completed, because the very items which were likely to be missing were those which tended to return to normal more slowly.

Although the recovery inventory consisted of 22 items, there may have been other factors which were important which were not included in the inventory. Some items such as whether the patient was discharged, had a stable pulse and blood pressure and no complications seemed not to have been useful indicators of recovery and would not be included in any future use of the inventory.

ii) Recovery Self Ratings

There were a few problems with this scale in that patients occasionally found it difficult to decide how fit they felt, in which case, a 'don't know' response was recorded. However, on the whole it worked well.

e) State-Trait Anxiety Inventory

This was the tool which caused the most problems. In retrospect, it would have been useful to include a visual analogue or verbal rating scale of anxiety for comparison. This was not included in the present study since the manual, Spielberger et al(1983) advises against the use of the word 'anxious' when administering the STAI, so it was avoided altogether.

Despite all the problems with the STAI, anxiety as assessed by the STAI did seem to exert a powerful effect on the major variables. It could be argued that anxiety was an influential variable, that the other tools used in this study were insensitive by comparison, or that anxiety showed less individual variation and thus revealed more correlations. This last point was not substantiated; although anxiety showed less variation than either measure of recovery, it exhibited more than pain and pain relief. That the other tools in the study were less sensitive was a possibility, but all showed variation between individuals and changes over time, so whilst the last two factors may have contributed, it seemed that anxiety was indeed an influential variable

Problems caused by and limitations of the STAI will now be discussed. Firstly, in this study each item on the inventory was read to the patient. This revealed that their responses were at times fairly arbitrary. For example, patients, in response to each item sometimes remarked, "somewhat or moderately so, it's all much the same." They were then urged to chose one or the other, which they invariably did. A very few patients felt it was difficult to differentiate so finely between such feelings. Other patients made comments such as 'Yes, I'm very worried, say 'moderately so'." These sort of decisions would not have been apparent had the inventory been self-administered, as designed. This rendered a detailed subdivision of the scores and comparison, for example, of 39.15 and 39.45 and a detailed discussion of this difference inappropriate. Secondly, problems arose with the overall inventory. Comments such as, "It's a load of rubbish", "It's too

American", "It doesn't apply to me" and "Who makes all this up?" were made. Other comments included descriptions of the inventory as "silly", "stupid", "repeats itself", "all the same", "contradictory", "extraordinary", "ridiculous", and "ghastly". The nature of the items was a problem on occasions. One man said, "I'm not going to do this - it's designed to catch you out. It makes you say things then asks the same thing in the opposite way." The length of the questionnaire was, for ill patients, a problem at times. The researcher sometimes judged the patients too ill or drowsy to be able to concentrate on this inventory. Whilst this was an entirely subjective decision, discretion was used and it was implicit that the unwell patient would not be subjected to undue pressure to complete scales. Three patients who had completed the anxiety state scale refused to complete the trait scale because of the number of questions. However, it was usually after surgery that patients disliked completing the inventory and comments such as, "not this again" were not uncommon.

Thirdly, specific items caused problems. 'I feel self-confident', 'I feel joyful', 'I feel pleasant' and less frequently other items engendered the retort, "How can I in here?" Some items were not understood by patients. These included the words 'inadequate', 'indecisive' and 'self-confident'. 'I have disturbing thoughts' was felt by some patients to have psychiatric connotations. 'I feel pleasant' almost without exception was either meaningless for patients or produced a multitude of wry comments, especially from the male patients, some of whom interpreted it as having homosexual connotations.

There were very specific problems with one orthodox Roman Catholic lady. She felt it was "sinful" to be satisfied with yourself and questioned whether 'I feel like a failure' meant in the eyes of God or in the eyes of men. Since she felt this type of introspection was not only sinful but the root of many problems in society today, the inventory was abandoned in this case. However, she highlighted the problem that many patients,

whilst happy to rate something presumably to them more objective and concrete like pain, did not like examining feelings such as those in the inventory. Patients were often suprised at the questions and at times were obviously uncomfortable when answering them.

All these sorts of remarks from patients only served to reduce an otherwise good rapport. There were a very few positive comments from patients who found the scale useful, but these really were in the minority.

However, despite its problems, the reliability data showed it was still a robust test. Whether an analogue or rating scale for anxiety, similar to that used to assess pain, would have been an adequate reflection of anxiety was unknown, but with ill patients it may have to be considered. An opportunity to compared STAI scores with those from such a rating scale was missed in this study.

The researchers attitude when administering this scale was important. Given the adverse comments and loss of rapport the inventory produced, it seemed likely the researcher could become rather diffident about administering the inventory. However, it was pointed out that a buisness-like approach to this scale was essential, and this was adopted. It was administered in a very routine manner and although comments still kept coming, the researcher became better equipped to deal with them.

f) The Rest of the Interview Schedule

This worked very well, and there were no real problems with it. Occasionally, if the patient was drowsy or did not seem up to answering questions (for example, if they felt sick), the interview was kept very short. The patient was asked if they had any pain now, and if so, whether they wanted a painkiller for it. Other responses were reocrded as unavailable.

4.18.4 Time Schedule

This schedule worked very well, and patients could nearly always be

seen within the half hour time period assigned for each interview.

4.18.5 Time Span Studied

Patients were interviewed preoperatively on admission, then twice a day for seven consecutive days after surgery. Thus the pre-admission period from, for example, the out-patient appointment to admission was neglected. Also the period after the seven postoperative days was not studied. Thus the 'aftermath' of pain, discussed by McCaffery(1979) as so important, when the painful experience would be assimilated was neglected, as was the recovery process which seemed likely to continue beyond seven days and indeed well after discharge from hospital. Whilst all these areas would have been interesting, given the intense nature of the data collection, it was necessary to concentrate on a more limited time period.

4.18.6 Miscellaneous

a) Relationship with Patients

Good rapport with patients was essential to obtain honest responses and maintain cooperation over the seven postoperative days. It was felt, subjectively, that this rapport was achieved. The patients was usually glad someone was taking an interest, and when they knew they would not have to answer questions when they felt unwell, and would not be especially woken when asleep, this all helped to increase this rapport. Many patients commented they had enjoyed the visits and the researcher had helped to pass the time of day, or had broken the day up. Whilst these may not have been very positive comments, they were not negative. Although interviews lasted only five to ten minutes twice a day for seven consecutive days, inevitably a relationship built up and the extent to which a Hawthorne/Placebo/Distraction effect operated was not be assessed. Interviewing patients was not a one-way process as Webb(1984) emphasised, and it would have been very difficult just to soak

up all the information necessary to complete the interview and then leave. Once the interview was completed, patients often chatted informally, and, for example, introduced the researcher to relatives and friends who arrived.

b) Relationship with Staff

Most contact with staff was with the nursing staff, but inevitably doctors, anaethetists, physiotherapists and pharmacists also formed part of these contacts. Frequent introductions were necessary to new learner nurses as they rotated through the wards, and to the junior house doctors who changed every three or six months. The relationship with doctors was very varied. The researcher introduced herself to doctors on the wards concerned and briefly explained the purpose of the study. Most seemed interested, were polite and always said 'Hello', whilst others, usually, but not always junior doctors, totally ignored the researchers presence. The anaethetists, physiotherapists and pharmacists were usually interested in the research and very encouraging. The relationship with the trained nursing staff was good. The researcher was usually left to herself and was definitely not 'one of the team', despite 15 months on the ward, but trained staff were polite and helpful. Learner nurses were more variable. Some were very interested in the study, thought it was a good idea and readily rated the patients pain. There was a tendency for some to be more suspicious. Initially, at least, they saw research as a 'doss' and said they would 'quite fancy' research. Some conveyed the impression the ratings of the patients pain were an intrusion on their time. Staff interruptions during the interview, mostly from learners, were a problem. It was possible they wished to convey they did not see the research as a threat, or they did not see the research interviews as important in the light of their work. Nurses carrying out patient observations would sometimes come up to the patient and make the observations while the patient was being interviewed, or would ask the patient questions, or try and take them for a walk. One student nurse once drew the curtains around the bed and

stood, hands on hips, without a word of explanation to either the patient or the researcher. When it was explained the interview would be concluded in a couple of minutes, the nurse was heard to complain loudly to her colleagues. When the researcher emerged two minues later, the nurse had gone to tea.

c) Patients Privacy

At first, when nurses were new on the ward, they occasionally listened to the patient interviews. This may have affected the patients responses, although the nurse was usually reasonably discrete. Other patients could listen to the patient's answers. There was really no way around this problem as it would have been impossible to interview patients off the ward, especially immediately after surgery. Sofaer(1984) drew the curtains around the bed, however, this was not done because it felt this may have made the interview more of a 'procedure', and curtains would not stop other patients listening to the conversation.

d) Frustrations for the Researcher

It was very difficult to remain detatched, especially if a patient rated their pain as very bad, and the nurse said the patient was fine and had no pain. All that could be done in that situation was to advise the patient who wanted a painkiller that they should ask the nurse.

Being a nurse made it very difficult at first to overcome the urge to 'help out' when the ward was very busy and short of staff. At first, this was quite stressful, especially when it was accompanied by remarks about what a 'doss' research was. However, as the researcher's confidence increased, this was much less of a problem.

Other frustrations were minor and seemingly inevitable in research. These included the closing of wards and theatres, lack of blood causing operations to be cancelled or postponed, patients booked for admission not materialising and a icy spell resulting in an increase in patients with

fractures causing routine admissions to be postponed.

The feedback session to the hospital was somewhat disappointing. The senior nurse manager was met first and was very interested in the results and any changes which could be made. The feedback session to nurses on the ward was less successful. Whilst the session was well attended, questions were rather limited and concentrated largely on staffing problems. It was felt the nurses may have been inhibited by the presence of senior nurses at this session, so a summary of the results was sent to each ward and a letter saying any comments were very welcome and the researcher would be pleased to discuss the findings more informally at ward level. No comments or requests for such discussions were made. Similarly, although the school of nursing when giving permission for learners to rate the patients pain, had requested that study results be presented at the school of nursing, no reply was received to two letters attempting to arrange such a feedback session.

4.18.7 Revised Assumptions

Initially it was assumed pain was bad and should be totally relieved. Since undertaking this study, this assumption has been revised to relieve the pain as much as the patients wants, after discussion and advice from an informed nurse on all aspects of this. This requires a very active intervention by the nurse, and is not a mandate for apathy, or 'that's what the patient wants' when what patient wants has not been assessed with the patient, if at all. Some pain has some value for some patients on some occasions.

CHAPTER FIVE - DISCUSSION, SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 DISCUSSION

This study set out to examine pain, pain relief, anxiety and recovery and their inter-relationships in patients undergoing surgery. These interrelationships were discussed earlier, pp 290 to 294. This section will focus on the professional implications of the study.

The findings of this study revealed pain was poorly controlled after abdominal surgery, which confirmed the work of Cohen(1980). Nurses consistently rated the patients pain lower than did the patient. The way in which nurses assessed the patients pain was unknown. The factors which nurses considered when giving painkillers suggested nurses may, in theory at least, have based their decisions on a variety of criteria such as pain, time since surgery and type of operation. It seemed, however, that discussion with the patient was not of major importance in any assessment. No evidence was found to suggest nurses systematically assessed pain, substantiating Graffam's(1981) findings, and which may have at least partly accounted for the differences between the nurses' and patients' ratings of pain.

Caring for patients in pain is a central aspect of postoperative care, yet in the present study it appeared to be rather peripheral in this care. Possible reasons behind the low priority allocated to pain and its control will now be discussed.

There appeared to be a difference between what happened in theory and what happened in practice. Pain relief was almost always noted on nursing care plans as a potential problem, usually with the ultimate goal of 'a pain free patient.' It thus seemed nurses knew pain was likely to be a problem, but for various reasons were ineffective in providing adequate relief. Even if a painkiller was given, it was not always effective, which supported the findings of Bourbonnais & Mackay(1981). The possibility of ineffectiveness was often overlooked, presumably as the effect of painkillers

once administered was not assessed. This suggested the nursing care plan goal of 'pain free patient' was not systematically evaluated. Thus although the nurses knew pain may be a problem, they often failed to act on this knowledge. It appeared painkillers were at times administered according to the patients operation rather than their pain. This supported the findings of Davitz & Davitz(1981) and Dudley & Holm(1984) who found the patients condition was an important determinant of the nurses inferences of suffering.

Pressure of work on the ward may have been another factor in the low priority sometimes allocated to pain relief. The learners especially seemed, at times, to be under considerable pressure to 'get the work done'. This work appeared to centre on tasks for which they were accountable. This had the effect of pushing pain relief down the list of priorities. This may have been a cause of increased stress if the learner knew the patient was in pain, and may have encouraged early development of distancing techniques.

This pressure of work was often effectively transmitted to the patients. They received certain verbal and non-verbal messages from the nurses in relation to pain control. Patients often remarked that they knew the nurses were busy with other patients. They accepted this and in effect also accepted poor pain relief, for which they felt grateful. This indicated that patients often had low expectations of pain relief, a conclusion also reached by Hunt et al(1977). Patients rarely complained and often commented that the nurses were badly paid, overworked and understaffed. If the nurses reinforced these points, it seemed likely demands on their time would be reduced. Whilst the nurse may have been very busy, this was not always the case. Thus these messages were at least partly self protective. Nursing can be stressful at times, and it may be inevitable that some sort of distancing techniques emerge. However, there is a fine line between self protection and unprofessional behaviour. Nurses need to consider whether they make their patients feel grateful for their care at times, and examine their motives for taking such an approach. Praise and gratitude from

patients forms part of job satisfaction, but care must be taken that this gratitude is not manipulated. Avoiding or failing to assess the patient in pain may actually increase stress for the nurse (as well as for the patient), as an implicit part of the nurses role is the relief of suffering. Knowledge that a patient is suffering, however far this is from conscious thought, could provoke role conflict and thus stress for the nurse.

It seemed self protection or distancing from pain was achieved by not assessing pain, by accepting pain as inevitable after surgery, by regarding painkillers as addictive - which supported the findings of Cohen(1980), and by being 'busy': Ley(1976) reported patients found it difficult to interrupt a 'busy' nurse. However, as the possibility of pain is a major feature of the postoperative period, it must be unprofessional to fail to assess pain and allow the patient to suffer.

From the patients' perspective, painkillers may be avoided for many other reasons. Patients did not always need much encouragement from the nurse not to take painkillers. Over three-quarters of patients said they disliked taking painkillers or would take them only if the pain was bad. Fears of addiction were often very real, especially with a current increase in the illicit use of narcotic drugs, which has received much media attention. Some patients possessed stoical attitudes and saw pain as an opportunity for self testing. A few of their comments summed up their feelings towards painkillers. "I'd rather suffer in silence than rely on them." and "It's better not to have anything - I've stuck it out so far, so I might as well for the last bit." Another said, "I'd rather fight it myself, it's more satisfying than artificial relief." The slight guilt patients felt at taking painkillers was illustrated by a patient who said, "I did something I've never done in my life - I asked for a painkiller." The remark, "I've cheated, I'm back on the painkillers" also illustrates guilt or perhaps a sense of failure or weakness associated with the use of painkillers.

So, it is not only the attitudes of the nurse to be considered, but

also those of the patients. The anecdotes illustrate the negative attitude many patients had towards painkillers. Despite this, there was no evidence nurses used any alternative forms of pain relief. They may have regarded postoperative pain as having an obvious cause and thus being mainly physiological and amenable to relief from painkillers. If so, this indicates a failure to appreciate the multiple influences involved in pain and its perception.

Communication difficulties between patient and nurse may have contributed to poor pain relief. Macleod-Clark(1983) documented the use of overwhelmingly closed and leading questions by nurses on surgical wards, and the blocking by nurses of open questions from patients. The interactions between the nurse and patient surrounding pain and its relief are complex. The patient must want to and be able to communicate their pain to the nurses. The nurse has to receive this message, believe the patient and take appropriate action to relieve the pain. At any one of these steps, communication may break down. For example, the patient may not want to bother a busy nurse, or may want to avoid taking painkillers. They may be unable to attract the attention of the nurse, the nurse may not believe the patient, or she may not take action to relieve the pain. Since junior nurses often care for patients, they also have to check painkillers with a more senior nurse who may or may not respond immediately and positively. This further complicates the interaction. The problems associated with relying on the patient to ask for a painkiller would be reduced if the nurse systematically assessed the patients pain, involving the patient in this assessment. It seemed in the present study that the nurse did not assess the patients pain, or if she did, she did not assess it with the patient.

This lack of involvement of the patient in any assessment was supported by the finding that nurses consistently underestimated the patients pain. This underestimation was also reported by Johnston(1976) and Latter(1985). The difference between nurses and patients ratings in the present study was

even more marked than it appeared, given that nurses and patients tended to cluster their responses over the words on the verbal rating scales. Also, despite the importance of pain and its relief in postoperative care, it was rarely mentioned in the nursing notes - the 'Kardex'. This was further illustrated in one case by a Kardex report which stated, "Patient refused to go for a walk." Pain was not mentioned, yet the reason the patient had refused was that he was in too much pain. Another nurse reflected the lack of individualised pain control when she said, "The patient's got a low pain threshold. Yesterday she was crying out for painkillers every three hours." These painkillers were received at intervals of 4 hours 50 minutes, 3 hours 40 minutes, 5 hours 35 minutes and 4 hours 35 minutes. "Today we're waiting for her to ask. I just get on with washing her and ignore her. Well, not ignore her, you know what I mean."

The social control nurses exercised in relation to painkillers was in evidence. One nurse remarked, "He's very good and hasn't had many painkillers. He's got the right attitude." And another said, "She's very good now, she doesn't need Pethidine." Fagerhaugh & Strauss(1977) recognised nurses often controlled patients expressions of pain rather than the pain itself. The effect that 'good' being equated with 'no painkillers' had on the patients was summed up by two patients. One commented, "I keep quiet even if the pain is severe, I don't want to get into the nurses bad books." The other said, "The nurses convey it's a bit naughty to take a painkiller - you should overcome without it. They make little of the pain, but this jollying along doesn't make the pain go away."

Information about the action of different painkillers, about alternative methods of pain relief and on methods of pain assessment is available. Even if the nurse is aware of this information, for some reason it is not being utilised on the ward. The outcome of this is patient suffering on a fairly large scale. One possible reason for this failure to use available information may be the lack of accountability surrounding the

relief of pain, which McCaffery(1979) has highlighted.

Nurses are accountable for other aspects of their care. For example, if temperature, blood pressure and pulse recordings are not made, the nurse is likely to be held responsible for this omission. These observations are recorded on a chart and it is easy to see at a glance if the information is missing. Pain could be systematically recorded in the same way.

If the patient does have unrelieved pain, who knows apart from the patient? The patient is unlikely to complain to the sister or consultant, and may consider possible repercussions, real or imagined, if they do so. In this study, there was no systematic pain assessment or pain chart to consult. Nursing Kardex reports only infrequently mentioned pain or its relief, as Sofaer(1984) also found. In contrast the extent of self care and mobilisiation were reported regularly. If pain and its relief were documented as frequently, pain relief might improve. It seemed that because the administration of painkillers was necessarily a joint effort between the doctor who prescribed and the nurse who administered them, the nurse did not always take full responsibility for pain relief. This situation was exacerbated by the lack of accountability surrounding pain management.

The nature of pain may account for part of the problem over its assessment and relief. Once, for example, a blanket bath is completed, it is finished. Similarly, once observations are made, the task is complete. Each may need to be repeated at some time in the future, but pain relief is rather more ongoing and intangible. Even once pain is relieved, it may come back at any time and thus needs constant assessment. Evaluation of any intervention is distanced from it in time. The process of pain relief if thus ongoing and there is no clear task complete' point. Relief of pain is perhaps more akin to psychological care than to one of a list of tasks.

Although current trends in nursing emphasise total patient care, progress in moving away from a list of tasks is slow. If the patient is treated as a whole, they would be much less likely to be left in pain. That

the patient is not being treated as a whole suggests the nursing process, used in all the study wards, is not achieving its aim of total patient care. In this study, in terms of pain relief, the nursing process appeared to operate as an exercise in its own right and actual pain control seemed to happen independently from the stated goal on the nursing care plan.

Perhaps for too long nurses have been resting on their image of caring, overworked, underpaid angels. Whilst any or all of these images may be correct, the do not constitute a professional approach to care. At this stage it is customary to add the proviso 'This is not to blame the nurses' or 'The nurses did the best they could' or 'some nurses obviously gave marvellous care' or even 'despite staff shortages/cuts/reorgansiation and subsequent low morale'. All these things did apply, but must not be used as an excuse. Nurses must confront the problem of pain relief and act. Caring for patients in pain is absolutely central to their work. Nurses must examine their practice, and in this case improve it.

The aim of adequate pain relief is not an over-sedated patient. Controlled drugs are not the answer to better pain relief, but in this study it seemed more could have been used. The effectiveness of non-narcotic analgesics for some pains should not be underestimated. However, it appeared non-narcotic painkillers were given more or less when the patient was able to take tablets, rather than when the type and intensity of the pain warranted this change. Complementary methods of pain relief, such as relaxation and distraction could be employed, especially on the later postoperative days, when painkillers can be less effective. Patients must be able to rely on frequent relief of pain, 'as needed'.

Pain and its relief is an area where the nurse has enormous potential. The issue is not only humanitarian, but systematic pain assessment and intervention would expand the nurses role in a truly nursing, rather than purely technical area. No new legislation is necessary, neither is conflict between the health professionals. All that is needed is a change of

emphasis in the utilisation of resources already available.

5.2 SUMMARY

This study had four aims. These were to: 1) assess whether pain and/or pain relief affect recovery, 2) determine whether anxiety affects pain, pain relief and/or recovery, 3) ascertain any differences between the nurses' and the patients' ratings of the patients' postoperative pain and pain relief, and 4) identify pain relieving strategies used by the nurses or patients. The extent to which these aims were achieved will now be considered.

In considering the first aim, neither pain nor pain relief showed any significant correlation with the recovery inventory. Patients own ratings of their recovery revealed a weak negative relationship with pain and a weak positive relationship with pain relief. The relationships between pain, pain relief and recovery were thus weak and inconclusive.

Examination of the findings pertinent to the second aim indicated anxiety trait exerted a minimal or no effect on most of the major variables. The exception was anxiety state, to which anxiety trait was consistently and positively correlated. Anxiety state and pain showed a fairly strong positive correlation, especially immediately after surgery. The correlations between anxiety state and pain relief were negative and weak, as they were with the recovery inventory. However, anxiety state showed a strong negative correlation with patients own ratings of their recovery on the later postoperative days. These findings suggested that ratings of pain, anxiety and the patients own ratings of recovery were interrelated.

Consideration of the third aim revealed that, using mean scores, nurses consistently rated the patients pain lower than did the patient, throughout the first seven days after surgery. No direct comparisons were available between nurses and patients ratings of pain relief, but whilst three-quarters of trained nurses felt analgesics met the needs of the patients, over 40% of patients had 'quite a lot of pain' or more on the first postoperative

day.

Pain relieving strategies used by nurses consisted almost exclusively of administering analgesics. The factors nurses took into account when giving a narcotic or non-narcotic analgesic showed a wide inter-individual variation. This emphasised the complexity of making a decision to administer an analgesic, and the variation between nurses in this assessment. Factors considered by nurses revealed misconceptions as well as useful practices. Patients pain relieving strategies focused mainly on painkillers, but some patients had developed alternative methods of pain relief, such as distraction and relaxation.

5.3 CONCLUSIONS

The findings of this study indicated that the relationships between pain, anxiety and recovery were certainly complex. Pain and anxiety seemed interrelated to some extent, although their relationship with recovery was less clear.

This study demonstrated that the relief of pain after abdominal surgery was not ideal. Over 86% of patients had 'quite a lot of pain' or more at least once when interviewed after surgery. A leader article in the British Medical Journal(1976) suggested doctors and nurses, like patients, "...too complacently accepted pain as an inevitable consequence of surgery." p664. Ten years on, little seems to have changed.

As painkillers were fewer and tended to be less effective with time, the later postoperative days are perhaps a time when nurses could have a large influence and encourage the use of complementary methods of pain relief. Patients may have already developed their own methods of pain relief, which could be used and built upon.

Nurses certainly have a long way to go before they fulfil their role in pain relief. Pain and its relief need to be assessed with and not on the patient. There are large individual variations between the patients which do not appear to be predictable. It is thus essential to assess pain individually, and not by, for example, operation or sex. Although their may be certain trends for certain operations, these are very much only averages and thus the patient can be the only authority about their pain and as such must be believed.

Pain relief needs to be given a high priority in nursing care. At present nurses are rarely accountable for the pain relief of patients in their care and thus seem not to give it a high priority. When pain is assessed and recorded, nurses will become more accountable for its relief. A record will also be provided for other nurses and health professionals to consult.

In 1953 Bonica stated, "The proper management of pain remains after all, the most important obligation, the main objective and the crowning objective of every physician." p 25. Hopefully, this is true of every surgeon and nurse. Thirty years later, perhaps in desperation of any improvement, Meinhart & McCaffery(1983) went one step further when they argued, "...failure to treat pain is inhumane and constitutes professional negligence." p vi.

5.4 RECOMMENDATIONS

5.4.1 For Nursing Practice

Pain relief must be given a high priority in nursing care. Each nurse must take responsibility for assessing the pain of patients in her care, and not leave it to someone else.

Nurses need to recognise the individual, unpredictable nature of pain and thus the importance of believing the patient. Pain needs to be assessed with and not on the patient whenever possible. A pain chart, completed with the patient will serve as a record for other health professionals to consult. It will also show the patient that their pain is taken seriously, and something is being done to reduce that pain. If a pain chart is used, the effectiveness of pain relief measures evaluated, and adjustments made as necessary. This will be a start towards the provision of individualised pain control. Treating the patient as a whole person and individualising their care will not only make the nurse more accountable for her pain relief, but also more humane and professional.

As professionals, nurses have a duty to provide pain relief after surgery. The complex nature of pain needs to be recognised and thus pain and pain relief should be discussed with the patient, taking into account their preferences and usual methods of coping, advising them as necessary on alternative methods of pain relief. The disadvantages of poor pain relief should be discussed as necessary. The nurse and patient need to reach a decision about pain relief together. The nurse does not and cannot always know best.

Pain is very complex and modulated in many different ways, so it is not easy to assess and treat. However, nurses need to become more proficient. Pain relief, especially that of postoperative patients has been dealt with in a haphazard manner for far too long. If nurses are to become more professional, they must be accountable for their care. Poor

postoperative pain control has been highlighted before, by for example, Cohen(1980). Is it unrealistic to expect reasonable pain control? In this study some patients undoubtedly suffered as their anecdotes revealed. At times, for some patients, the pain was so bad they wished they were dead or did not care if they were alive or dead. Is this the effect nurses aim to produce in their patients? By no stretch of the imagination can this be regarded as professional or even adequate nursing care.

5.4.2 For Nursing Education

Nurses are caring for patients in pain from their first day on the ward. They need to have accurate information right from the start of their training. This information needs not only to cover the use of analgesics and their effects, but also alternative and complementary methods of pain relief. They need to be aware of the complexities of pain and of how it can be assessed. If the learner nurse can grasp the individual and thus unique nature of pain, they may start to recognise the importance of assessing pain with the patient and of believing the patient. This would represent a major step towards the type of thinking necessary before adequate pain relief can be achieved.

A variety of techniques could be used to present this information, including practical demonstrations of, for example, distraction and relaxation. The nurses should be encouraged to teach these technique to others, and could be assessed using them with patients. Talking to postoperative patients about their experiences of pain, and discussing these experiences with peers could help to provide insight to the patients experiences. Videotapes of other nurses dealing with patients in pain, for example, Latter(1985), could also be used to stimulate discussion. They could also make the learner more sensitive to the many different ways in which patients manifest pain.

Nurses need not only the knowledge, but must be encouraged to apply,

and be assessed applying, that knowledge for the benefit of the patient.

Emphasis on the reporting and documentation of pain and its relief appear, from the study results, to need a much greater emphasis.

5.4.3 For Nursing Management

Trained staff need the opportunity to regularly update their knowledge about pain and its relief. They also need the tools with which to assess pain, and the support from their managers to learn and apply alternative methods of pain relief. They need encouragement to evaluate their own practices, as better pain control may reduce postoperative complications and thus the length of hospital stay, which has cost saving implications. There is a place for monitoring standards of pain control on the wards, and such monitoring may be useful for keeping track of progress in this area. Programmes could be developed to encourage trained staff to continously monitor their care, perhaps using a system of peer group review.

In the present study, if enrolled nurses had been allowed to check controlled drugs, by providing a greater number of staff who could check these drugs, more rapid administration of these painkillers may have been achieved. These nurses and their managers would need to feel confident that they had adequate knowledge and training to take on this responsibility. A relaxation of the 72 hour/three day limitation on the validity of controlled drugs prescriptions could have prevented unnecessary suffering for patients. These prescriptions often expired and there was a time lag before they were renewed, sometimes leaving the patient without any analgesic cover for this time. An unlimited time for these prescriptions may remove a barrier to continued use of these drugs after the first 72 hours postoperatively, when this is necessary. Alternatively, nurses and doctors could be encouraged to always assess each patient before the prescription expired, so it could be renewed as necessary. However, this would inevitably be a less satisfactory alternative.

5.4.4 For Nursing Research

Any further studies using the State-Trait Anxiety Inventory could usefully include a verbal rating scale measure of anxiety and investigate the relationship between the two scales. An examination of anxiety absent items and anxiety present items from the STAI and their relationship with other variables would be interesting.

Recovery inventory scales which are weighted and the way in which this weighting might be developed could form the basis of a future study, as could an examination of the interrelationship between physiological and psychological aspects of recovery.

If both physiological and psychological aspects of any variable are considered, this suggests that a team approach to future research, using researchers from different disciplines would be helpful. Each could benefit from each other's expertise and perspective.

An evaluation of the teaching and use of alternative methods of pain relief could serve to advance knowledge in this relatively uncharted area.

Examination of the different trajectories of pain, pain relief, anxiety and recovery for different patients would be interesting, as would relating these different trajectories to different patient outcomes.

The way in which patients cope with surgery and the strategies they use could be studied. The results from such a study would provide a framework which nurses could utilise to help patients cope with surgery. The way in which patients cope could also be related to measures of patient outcome.

Future research could look in detail at the context in which nurses made decisions about pain and its relief. The stresses these decisions place on the nurse and the way in which these decisions reflect priorities of care of both the nurse and of those to whom she is answerable could be examined.

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APPENDICIES

APPENDIX A - RESULTS

A.1 RESULTS OF SECOND PILOT STUDY

Background Information

Table A - AGE

AGE	n
18-25	0
26-35	4
36-45	1
46-55	0
56-65	2
66-75	2
76 +	1
TOTAL	10

Table B - SEX

SEX	n
MALE	5
FEMALE	5
TOTAL	10

Table C - MARITAL STATUS

STATUS	n
SINGLE	3
MARRIED	4
DIVORCED	1
WIDOWED	2
TOTAL	10

Table D - PREVIOUS OPERATIONS

PREV. OP.	n
NONE	4
ONE	3
TWO	2
THREE	0
FOUR	1
TOTAL	10

Table E - TYPE OF OPERATION

TYPE	n
CHOLECYSTECTOMY	5
OTHER, NO CANCER	3
OTHER, CANCER	2
TOTAL	10

Ethnic Origin

All 10 patients were Caucasian.

Preoperative Nights in Hospital

The number of preoperative nights in hosptial ranged from 1-4, median of 1.33, mode of 1.

Postoperative Nights in Hosptial

The number of postoperative nights in hospital ranged from 5-28, median of 8.5 and mode of 8.

Main Variables

These results will be presented under the four main aims of the study.

Aim 1 - To assess whether pain and/or pain relief affect recovery.

Pain and pain relief were assessed twice daily, then these scores summated (as Boore 1978 had done) and divided by 2 to give one daily assessment of pain and pain relief for the purpose of this analysis. Spearman's Rank Correlation Coefficient (r_s) was used to look at the association between these variables. Four correlations were calculated:- 1) Correlation between mean pain ratings and mean recovery inventory scores, 2) Correlation between mean pain ratings and mean recovery self rating scores, 3) Correlation between mean pain relief ratings and mean recovery inventory scores, 4) Correlation between mean pain relief ratings and mean recovery self rating scores.

1) There was a significant negative correlation between pain scores and the recovery inventory scores. $r_s = -0.91$, $p<0.01$. Thus as pain decreased,

the recovery inventory scores increased.

2) There was no significant correlation between pain scores and recovery self rating scores. r_s =-0.57, p>0.05

3) There was no significant correlation between pain relief scores and recovery inventory scores. r_s =-0.535, p>0.05

4) There was a significant negative correlation between pain relief scores and recovery self rating scores. r_s =-0.75, p>0.05. Thus as pain relief declined, perceptions of recovery increased.

Aim 2 - To determine whether anxiety affects pain, pain relief and/or recovery.

Spearman's Rank Correlation Coefficient (r_s) was again used to look at the association between these variables. Four correlations were calculated: 1) The correlation between mean state anxiety scores and mean pain scores, 2) The correlation between mean state anxiety scores and mean pain relief scores, 3) The correlation between mean state anxiety scores and mean recovery inventory scores, and 4) The correlation between mean state anxiety scores and mean recovery self rating scores.

1) There was no significant relationship between anxiety scores and postoperative pain ratings . r_s =0.58, p>0.05

2) There was no significant correlation between anxiety scores and pain relief ratings. r_s =0.64, p>0.05

3) There was a significant negative correlation between anxiety scores and

recovery inventory scores. r_s =-0.82, p<0.05. Thus as anxiety scores decreased, recovery inventory scores increased.

4) There was a significant negative correlation between anxiety scores and recovery self rating scores. r_s =-0,92, p<0.01 Thus as anxiety scores deceased, recovery self rating scores increased.

Aim 3 - To assess any differences between nurses' and patients' ratings of the patients' postoperative pain and pain relief.

The Wilcoxon Signed Rank test was used to look at the differences between individual pairs of observations. It was found that the probability of an occurrence of values as extreme as those observed was z= -3.0 p<0.0028 (two-tailed). The z value was used as the number of pairs was greater than 25 (Seigel 1956, p79, figure 5.5). Thus there was a significant difference between nurses' and patients' ratings of the patients' postoperative pain; the nurses' ratings being consistently lower than those of the patients. Of the 140 possible nurses ratings, only 51.4% of nurses were available to make these ratings.

Nurses ratings of pain relief were discontinued after the first pilot study, so no comparisons are presented.

Aim 4 - To identify pain relieving strategies used by patients and nurses.

The nurses strategies were determined by the nurses' questionnaire. This questionnaire was pre-piloted on colleagues to refine the questions. A pilot study with six nurses from a similar group of nurses, not from the same hospital as was used in the main study, was conducted and no amendments were necessary.

Patient strategies were determined by asking the patient 'Does anything make your pain any better?' (asked twice a day) and what they did if they had pain (asked at the final interview only). There were 119 responses to the

question, "Does anything make the pain better?" over the 14 interviews.

Table F - DOES ANYTHING MAKE THE PAIN BETTER?

STRATEGY	%*
DRUGS	34
NOTHING	24
KEEPING STILL	17
COMBINATION	09
DISTRACTION	07
SUPPORT WOUND	04
SPECIFIC POSITION	03
REST	02
PRESSURE	01

*The % were rounded to the nearest whole number.

Table G - WHAT DID YOU DO IF YOU HAD PAIN?

STRATEGY	n
RING FOR NURSE	5
DO SOMETHING SELF**	2
PAINKILLER	1
DON'T KNOW	1
TOTAL	9

* 1 Patient was discharged before completing the final interview. ** Included wriggling, listening to music, staying calm.

Additional Findings

The two recovery scores; the patient's own rating of recovery and the recovery inventory (derived from 22 indicators of recovery taken from the literature) were used. A Spearman's Rank Correlation Coefficient was

performed to look at the association between these scores. There was a significant positive correlation between the two scores, $r_s = 0.90$, $p < 0.05$.

A.2 CLUSTERING OF POSTOPERATIVE PAIN SCORES

PAIN SCORE		PATIENT RATINGS		NURSE RATINGS	
		n	%	n	%
0	NO PAIN AT ALL	377	37.25	127	57.46
1		3	0.30	0	0.00
2		13	1.28	0	0.00
3		10	0.99	0	0.00
4		2	0.22	0	0.00
5	SLIGHT PAIN	298	29.44	43	19.46
6		5	0.49	0	0.00
7		12	1.18	5	2.26
8		4	0.39	1	0.45
9		14	1.38	0	0.00
10	QUITE A LOT OF PAIN	168	16.60	40	18.10
11		1	0.09	0	0.00
12		2	0.20	2	0.90
13		3	0.30	0	0.00
14		3	0.30	0	0.00
15	VERY BAD PAIN	73	7.21	2	0.90
16		2	0.20	0	0.00
17		3	0.30	0	0.00
18		2	0.20	0	0.00
19		0	0.00	0	0.00
20	AGONISING PAIN	17	1.68	1	0.45
TOTAL		1012	99.98	221	99.98

A.3 CLUSTERING OF POSTOPERATIVE PAIN RELIEF SCORES

PAIN RELIEF SCORE		PATIENT RATINGS	
		n	%
0	PAIN NO BETTER	35	8.12
1		1	0.23
2		1	0.23
3		1	0.23
4		2	0.46
5	PAIN SLIGHTLY BETTER	113	26.22
6		2	0.46
7		1	0.23
8		2	0.46
9		0	0.00
10	PAIN QUITE A LOT BETTER	151	35.03
11		0	0.00
12		0	0.00
13		0	0.00
14		0	0.00
15	PAIN VERY MUCH BETTER	73	16.94
16		0	0.00
17		1	0.23
18		1	0.23
19		0	0.00
20	PAIN COMPLETELY BETTER	47	10.90
TOTAL		431	99.97

A.4 PERCENTAGE OF PATIENTS ACHIEVING EACH RECOVERY INVENTORY(RI) ITEM PER DAY

ITEM		DAY							
NO.	DESCRIPTION	PRE	1	2	3	4	5	6	7
1	Stable BP & P	98.57	87.50	93.75	96.25	92.20	88.15	93.42	93.15
2	Passing Urine	100.00	35.00	55.00	66.25	70.12	81.57	82.89	84.72
3	30ml Water	100.00	20.00	42.50	71.25	81.81	88.15	89.47	93.05
4	60ml Water	100.00	10.00	26.25	51.25	55.84	75.00	85.52	87.50
5	Free Fluids	100.00	8.75	20.00	36.25	44.15	57.89	73.68	83.33
6	Oral Food	100.00	1.25	6.25	17.50	31.16	38.15	59.21	75.00
7	Bowels Open	95.00	1.25	3.75	11.25	33.76	63.15	76.31	90.27
8	Pain Free	91.25	2.53	8.86	8.75	20.77	22.36	40.78	48.61
9	Indpt. Bed	100.00	32.50	72.50	85.00	91.02	93.42	96.05	98.61
10	Indpt. Chair	100.00	17.72	35.00	56.25	80.51	85.52	89.47	88.88
11	Indpt. Wash	98.75	13.92	50.00	65.00	83.11	89.47	90.78	91.66
12	Walk End Bed	100.00	15.18	33.75	53.75	63.63	80.26	85.52	90.27
13	Walk To Toilet	98.75	13.92	30.00	47.50	57.14	78.94	82.89	90.27
14	Walk Out Ward	98.75	3.97	12.50	31.25	37.66	56.57	69.73	73.61
15	Appetite	80.00	2.94	8.69	18.42	20.83	21.62	32.39	34.72
16	Sleep	73.73	7.89	11.84	22.50	31.94	42.10	41.89	45.83
17	Concentration	96.25	7.46	11.76	18.91	27.77	39.18	52.85	66.66
18	Lack Fatigue	83.75	0.00	0.00	2.63	1.40	6.84	15.71	22.53
19	Lack Anxiety	82.53	73.52	86.66	83.33	95.45	91.48	95.65	97.77
20	Interest Surr.	100.00	13.23	39.13	57.89	77.77	87.83	85.91	87.50
21	Abs. Complic.	96.25	90.00	80.00	88.75	90.66	84.21	92.10	93.05
22	Discharge Home	N/A	0.00	0.00	3.75	1.29	0.00	3.94	5.47

A.5 LIST OF MAIN STUDY PATIENT OPERATIONS

OPERATION	n
Cholecystectomy	23
Abdomino-perineal resection	9
Closure of Colostomy	7
Sigmoid Colectomy	6
Appendicectomy	4
Gastrectomy (Total/Partial)	4
Hemicolectomy	4
Incisional Hernia Repair	4
Laparotomy	4
Anterior Resection	3
Gastroplasty	3
Nephrectomy	3
Other	6
TOTAL	80

APPENDIX B - TOOLS USED

B.1 PATIENT INTERVIEW SCHEDULE (Reduced in Size)

DEMOGRAPHIC DATA

Patient Study Number:-.....

Date:-.....

PROA. AGE

1. 18-25 [] 5. 56-65 []
2. 26-35 [] 6. 66-75 []
3. 36-45 [] 7. 76 + []
4. 46-55 []

PROB. SEX

1. MALE []
2. FEMALE []

PROC. ETHNIC ORIGIN

1. BLACK []
2. WHITE []
3. ORIENTAL []
4. ASIAN []

PROD. MARITAL STATUS

1. SINGLE []
2. MARRIED []
3. WIDOWED []
4. DIVORCED []
5. SEPERATED []

PROE. No PREVIOUS OPERATIONS [] []

PROF. DIAGNOSIS

1. CHOLEY []
2. OTHER NCA []
3. OTHER []

.....

PROG. WARD

1. []
2. []
3. []
4. []

PROH. SURGEON

1. []
2. []
3. []
4. []

PROI NIGHTS IN HOSP. PRE-OP

[] []

PROJ NIGHTS IN HOSP. POST-OP

[] []

PREOPERATIVE QUESTIONS

It is very important that your answers are a honest and frank as possible. All your answers are completely confidential- no-one else will know what you've said
This is the measure of pain we are going to use now and after your operation.
EXPLAIN
As a practice imagine how much pain you'd have if you banged your knee against something hard.
Now put a cross on the line in the place you feel would be most like your pain.
PRQ01 SCORE.....
Does that make sense ?

PRQ01A. DO YOU HAVE ANY PAIN NOW SCORE.....

Give the pain scale

PRQ01B DOES ANYTHING MAKE IT WORSE/GIVE YOU PAIN ?

01 DRUGS.....[]
02 MOVING.....[]
03 KEEPING STILL.....[]
04 FATIGUE.....[]
05 SPECIFIC POSITION....[]
06 PRESSURE.....[]
07 COLD.....[]
08 FOOD/DRINK.....[]
09 COUGH/SNEEZE/LAUGH.....[]
10 NOTHING.....[]
77 OTHER.....[]
88 DON'T KNOW.....[]
99 NO ANSWER-N/A.....[]

PRQ01C HOW BAD IS IT THEN ? SCORE.....

PRQ01D DOES ANYTHING MAKE IT BETTER ?

01 DRUGS.....[]
02 MOVING.....[]
03 KEEPING STILL.....[]
04 SUPPORT.....[]
05 SPECIFIC POSITION....[]
06 PRESSURE.....[]
07 WARMTH.....[]
08 REST.....[]
09 RELAXATION
10 NOTHING.....[]
77 OTHER.....[]
88 DON T KNOW.....[]
99 NO ANSWER-N/A.....[]

PRQ01E HOW MUCH BETTER IS IT THEN ? SCORE.....

PRQ02 DO YOU HAVE ANY DISCOMFORT NOW ? SCORE.....

PRQ03 DO YOU EXPECT ANY PAIN ON THE FIRST DAY AFTER YOUR OPERATION ?

.....

PRQ03A WHAT MAKES YOU THINK THIS ?

1. TOLD BY FAMILY/FRIENDS [] 2 TOLD BY STAFF [] 3 PAST EXPERIENCE []

4. DON'T KNOW [] 5 OTHER [].....

PRQ04 IF YOU HAD A PAINKILLER, WOULD YOU EXPECT YOUR PAIN TO BE :- SCORE.....

PRQ05 IF YOU HAD PAIN AFTER YOUR OPERATION, WHEN WOULD YOU WANT A PAINKILLER ?
SCORE.....

PRQ06 DO YOU EXPECT THE NURSE WILL KNOW WHEN YOU NEED A PAINKILLER OR WILL YOU
HAVE TO ASK FOR IT ? .....

PRQ07 WHAT DO YOU NORMALLY DO IF YOU HAVE PAIN ?.....
.....

PRQ08 WHAT ARE YOUR FEELINGS ABOUT TAKING PAINKILLERS ?

.....

PRQ09 DO YOU KNOW HOW LONG YOU WILL BE IN HOSPITAL?.....

PRQ10 HOW DO YOU FEEL ABOUT COMING INTO HOSPITAL FOR AN OPERATION ?.....
.....

PRQ11 IS THERE ANYTHING IN PARTICULAR THAT WORRIES YOU ?.....
.....

PRQ12 HOW DO YOU FEEL IN YOURSELF ? (General mood).....

.....

PRQ13 IF YOU FEEL BAD OR THINGS GET BAD IS THERE ANYTHING YOU DO OR THINK TO FEEL BETTER ?.....

PRQ14 IF 100% IS THE FITTEST YOU'VE FELT RECENTLY, HOW FIT DO YOU FEEL NOW ?

.....%

PRQ15 Finally, there are some questions on how being in hospital makes you feel. You'll only be asked to do it all once, now. After your operation you'll only be asked to do part of it

A-S These questions look at how you feel right now, at this moment.

A-T These questions look at how you usually feel (in general)

A-S..... A-T.....

Thank-you very much for your time you've been very helpful. I won't visit you on the day of the operation, but I shall be visiting you the next day to see how you are getting on
I realise you may not be feeling very bright for the first few days, but it would be very helpful if you could answer the questons as accurately as you can

ENSURE RECOVERY INVENTORY QUESTIONS COMPLETED

POSTOPERATIVE QUESTIONS FOR PATIENT'S NURSE

N001-14														
	N001	N002	N003	N004	N005	N006	N007	N008	N009	N010	N011	N012	N013	N014

1=Std 2=Pupil 3=SEN 4=SRN 5=NURSE UNAVAILABLE

N101-14 Does...have any pain now ?

DAY	1		2		3		4		5		6		7	
	am	pm	am	pm	am	pm	am	pm	am	pm	am	pm	am	pm
SCORE														
	N101	N102	N103	N104	N105	N106	N107	N108	N109	N110	N111	N112	N113	N114

N201-14 COMMENTS

Postoperative Questions for Patient

Patient Number: DOA: DOOP: DD DISCHARGE:
Operation: AM/PM

ANAESTHETIC DETAILS:-
QA Anaesthetic used.....QB Time under Anaesthesia.....

Drugs:Regular Drugs:PRN

ANALGESIA SINCE LAST VISIT (from drug card)

PRESENT		ANALGESIC/SEDATIVE/ANTIEMETIC						
DATE	TIME	TYPE	DOSE	TIME	ROUTE	INT	=/<	PRN

Its very important you reply as honestly as you can-what you really feel-don't forget no one else will know what you have said
(Note any social desirability)

1) Q01A01-14 DO YOU HAVE ANY PAIN NOW ?

DAY	1		2		3		4		5		6		7	
	am	pm	am	pm	am	pm	am	pm	am	pm	am	pm	am	pm
SCORE														
	01	02	03	04	05	06	07	08	09	10	11	12	13	14

Q01B HOW DOES THIS MAKE YOU FEEL ?

Q01B01 1am.....Q01B08 4pm.....

Q01B02 1pm.....Q01B09 5am.....

Q01B03 2am.....Q01B10 5pm.....

Q01B04 2pm.....Q01B11 6am.....

Q01B05 3am.....Q01B12 6pm.....

Q01B06 3pm.....Q01B13 7am.....

Q01B07 4am.....Q01B14 7pm.....

Q01C DOES ANYTHING MAKE IT WORSE / GIVE YOU PAIN ?

Day	1 am	1 pm	2 am	2 pm	3 am	3 pm	4 am	4 pm	5 am	5 pm	6 am	6 pm	7 am	7 pm
01 DRUG														
02 MOVING														
03 KEEPING STILL														
04 FATIGUE														
05 SPECIFIC POSITION														
06 PRESSURE														
07 COLD														
08 FOOD/DRINK														
09 COUGH/SNEEZE/LAUGH														
10 NOTHING														
11 GAS PAINS														
12 TUBES/DRAINS														
77 OTHER														
88 DON'T KNOW														
99 NO ANSWER														

Q01D HOW MUCH WORSE DOES THIS MAKE IT/IS IT THEN ?

DAY	1		2		3		4		5		6		7	
	am	pm	am	pm	am	pm	am	pm	am	pm	am	pm	am	pm

Q01E DOES ANYTHING MAKE IT BETTER ?

Day	1 am	1 pm	2 am	2 pm	3 am	3 pm	4 am	4 pm	5 am	5 pm	6 am	6 pm	7 am	7 pm
01 DRUGS														
02 MOVING														
03 KEEPING STILL														
04 SUPPORT														
05 SPECIFIC POSITION														
06 PRESSURE														
07 WARMTH														
08 REST														
09 RELAXATION														
10 NOTHING														
77 OTHER														
88 DON'T KNOW														
99 NO ANSWER														

Q01F
IF YES-HOW MUCH BETTER DOES THIS MAKE IT ? (Score)
IF N-DO YOU HAVE IT ALL THE TIME OR NOT ? (21 All time, 22 Not All time)

DAY	1 am	1 pm	2 am	2 pm	3 am	3 pm	4 am	4 pm	5 am	5 pm	6 am	6 pm	7 am	7 pm

OTHER:

1.....
2.....
3.....
4.....
5.....
6.....
7.....
8.....
9.....
10.....

Q02 HAVE YOU HAD A PAINKILLER ? (IF Y, DID YOU GET IT WHEN THE DRUG TROLLEY CAME AROUND OR NOT ?)

DAY	1 am	1 pm	2 am	2 pm	3 am	3 pm	4 am	4 pm	5 am	5 pm	6 am	6 pm	7 am	7 pm

1 = NO
2 = YES, DRUG TROLLEY
3 = YES,NURSE
4 = YES,PT ASKED
5 = YES OTHER
8 = DON'T KNOW

Q03 DOES THE PAINKILLER MAKE YOUR PAIN:-

DAY	1 am	1 pm	2 am	2 pm	3 am	3 pm	4 am	4 pm	5 am	5 pm	6 am	6 pm	7 am	7 pm

Q04 DO YOU WANT ANOTHER PAINKILLER NOW ?

DAY	1		2		3		4		5		6		7	
	am	pm	am	pm	am	pm	am	pm	am	pm	am	pm	am	pm

1 = NO
2 = YES, BUT NURSE TOO BUSY
3 = YES, BUT NOT TIME YET
4 = YES, OTHER

Q05 DO YOU HAVE ANY DISCOMFORT NOW ? (for eg from keeping still)

DAY	1		2		3		4		5		6		7	
	am	pm	am	pm	am	pm	am	pm	am	pm	am	pm	am	pm

COMMENTS

Q05A01 1am.....Q05A08 4pm.....

Q05A02 1pm.....Q05A09 5am.....

Q05A03 2am.....Q05A10 5pm.....

Q05A04 2pm.....Q05A11 6am.....

Q05A05 3am.....Q05A12 6pm.....

Q05A06 3pm.....Q05A13 7am.....

Q05A07 4am.....Q05A14 7pm.....

AM ONLY

Q06 DID YOUR PAIN DISTURB YOU SLEEP LAST NIGHT ?
DID ANYTHING ELSE DISTURB YOUR SLEEP LAST NIGHT ?

1.....5.....

2.....6.....

3.....7.....

4.....

1 = NO 3 = NURSE 5 = NOISE
2 = PAIN 4 = PATIENT 6 = OTHER

Q07 DID YOU WANT A PAINKILLER LAST NIGHT ?

DAY	1	2	3	4	5	6	7

N=1
Y & GOT=2
Y & DID NOT GET=3

Q07A1-Q07A7 NIGHT SEDATION

DAY	TYPE	DOSE	TIME	= OR < MAX DOSE
1				
2				
3				
4				
5				
6				
7				

I would just like to ask you again

Q08 DO YOU HAVE ANY PAIN NOW ?

DAY	1	2	3	4	5	6	7

PM ONLY

Q09 IF 100% IS THE FITTEST YOU HAVE FELT RECENTLY, HOW FIT DO YOU FEEL NOW ?

DAY	1	2	3	4	5	6	7

(1 = NORMAL or >, 2 = LESS/NOT NORMAL)

Q10 HOW IS YOUR APPETITE COMPARED TO NORMAL ?

DAY	1	2	3	4	5	6	7

Q11 HOW MUCH ENERGY DO YOU HAVE COMPARED TO NORMAL ?

DAY	1	2	3	4	5	6	7

Q12 HOW MUCH INTEREST CAN YOU TAKE IN WHAT'S GOING ON COMPARED WITH NORMAL ?

DAY	1	2	3	4	5	6	7

Q13 HOW IS YOUR CONCENTRATION COMPARED WITH NORMAL ?

DAY	1	2	3	4	5	6	7

Q14 ARE YOU PASSING WATER NORMALLY OR NOT ?

DAY	1	2	3	4	5	6	7

Q15 ARE YOU ALLOWED ANYTHING TO DRINK ?

DAY	1	2	3	4	5	6	7

Q16 ARE YOU ALLOWED ANYTHING TO EAT ?

DAY	1	2	3	4	5	6	7

Q17 HOW ARE YOUR BOWELS COMPARED WITH NORMAL ?

DAY	1	2	3	4	5	6	7

Q18 ARE YOU ABLE TO SIT UP THE BED ON YOUR OWN ?

DAY	1	2	3	4	5	6	7

Q19 ARE YOU ABLE TO GET INTO THE CHAIR FROM THE BED ON YOUR OWN ?

DAY	1	2	3	4	5	6	7

Q20 ARE YOU ABLE TO WASH YOURSELF OR NOT ?

DAY	1	2	3	4	5	6	7

Q21 HAVE YOU BEEN ABLE TO WALK TO THE END OF THE BED/OUT TO THE TOILET/OUT OF THE WARD ? (DO TICK,TICK,TICK,or TICK, X X etc in each box)

DAY	1	2	3	4	5	6	7

Q22 HOW DO YOU FEEL IN YOURSELF ? (GENERAL MOOD)

DAY

1_____

2_____

3_____

4_____

5_____

6_____

7_____

Q23 DO YOU FEEL FED-UP AT ALL ?

DAY

1_____

2_____

3_____

4_____

5_____

6_____

7_____

Q24 ARE YOU BORED AT ALL ?

DAY

1_____

2_____

3_____

4_____

5_____

6_____

7_____

I WOULD JUST LIKE TO ASK YOU AGAIN

Q25 DO YOU HAVE ANY PAIN NOW ?

DAY	1	2	3	4	5	6	7

AND FINALLY, THE MEASURE THAT LOOKS AT HOW YOU FEEL RIGHT NOW.

Q26

DAY	1	2	3	4	5	6	7
A-S							

26A RECOVERY SCORE

ACTIVITY	Pre Op	POSTOPERATIVE DAY 1	2	3	4	5	6	7
01 BP + PULSE STABLE								
02 PASSING URINE								
03 30 mls/hour								
04 60 mls/hour								
05 ORAL FLUIDS								
06 ORAL FOOD								
07 BOWELS OPEN								
08 PAIN FREE/NO ANALGESICS								
09 INDPT:MOVING IN BED								
10 T/R FROM BED TO CHAIR								
11 WASHING								
12 WALK TO END OF BED								
13 WALK TO TOILET								
14 WALK OUT OF WARD								
15 APPETITE								
16 SLEEPING								
17 CONCENTRATION								
18 LACK OF FATIGUE								
19 LACK OF ANXIETY								
20 INTEREST IN SURROUNDS								
21 ABSENCE-COMPLICATIONS								
22 DISCHARGE HOME	X							

LAST VISIT OF HOSPITALISATION ONLY

Q27 HOW DO YOU FEEL YOUR PAIN WAS CONTROLLED OVERALL ?

Comment:-.....

Q28 DID YOU KNOW WHAT TO DO IF YOU HAD PAIN ?

1 YES []

2 NO []

a) WHAT ?.....

b) WHO TOLD YOU 1 FAMILY/FRIEND [] 2 STAFF [] 3 OTHER [].....

Q29 DID YOU FEEL YOU COULD HAVE A PAINKILLER WHEN YOU WANTED IT OR NOT ?

1 YES []

2 NO []

a) Comments:-.....

Q30 WAS YOUR PAIN AS YOU EXPECTED ?

1 YES []

2 NO []

a) Comments:-.....

Q31 WAS THERE ANYTHING IN PARTICULAR WHICH MADE YOU MORE COMFORTABLE ?

1 YES []

2 NO []

COMMENTS:-.....

Q32 IS THERE ANYTHING YOU WOULD LIKE TO HAVE KNOWN BEFORE YOUR OPERATION ?

.....

Thankyou very much for your time and help over this past week.
If you would like to know the results of this study, I shall be leaving a copy of with the ward staff-by about mid-1986.

B.2 NURSE QUESTIONNAIRE (Reduced in Size)

NURSES QUESTIONNAIRE

I would like to ask you a few questions about patients who have had elective abdominal surgery. There are no right or wrong answers, it is your opinions that are important.

All answers will be treated in the strictest confidence and you will never be personally identified. I would welcome any comments you may like to make and space has been provided for this. Please answer all the questions.

1) In general, do you feel patients usually ask for a painkiller postoperatively if they need one? (Please tick one box)

a) Almost Always ☐
b) Often ☐
c) Sometimes ☐
d) Almost Never ☐
e) Don't Know ☐

Any Comments.....

2) What do you think is the aim of giving painkillers on the first two days after abdominal surgery? (Please tick one box)

a) To completely relieve pain ☐
b) To relieve as much pain as possible ☐
c) To relieve pain just enough for the patient to function ☐
d) To relieve the pain so the patient can just tolerate it ☐
e) Don't Know ☐

Any Comments.....

3) In general, on the second postoperative day, when Pethidine 100mg has been prescribed PRN 3-4 hourly, would you give it:- (Please tick one box)

a) Always every 3-4 hours ☐
b) Wait for the patient to ask ☐
c) See if it is needed on the drug round ☐
d) See if it is needed every 3-4 hours ☐
e) Other ☐ (Please specify).....
f) Don't Know ☐

Any Comments.....

4) Please list any factors you consider when giving a PRN narcotic analgesic to a postoperative patient when a flexible dose and time interval (e.g. Pethidine 50-100mg 3-6 hourly) have been prescribed.

.....

.....

.....

.....

Any Comments.....

5) Please list any factors you consider when deciding whether to give the post-operative patient a narcotic or a non-narcotic analgesic.

.....

.....

.....

.....

Any Comments.....

6) If an otherwise healthy postoperative patient received Pethidine 100mg 4 hourly for severe pain for one week, do you think they risk becoming addicted to the Pethidine? (Please tick one box)

a) Almost Never ☐
b) Sometimes ☐
c) Often ☐
d) Almost Always ☐
e) Don't Know ☐

Any Comments.....

7) What might you do if a patient reported pain, but it wasn't time for them to have another painkiller for an hour? (Please specify)

.....

.....

.....

.....

Any Comments.....

8) In general, do you think the analgesics given on this ward:- (Please tick one box)

a) Are more than the patient needs ☐
b) Meet the patient needs ☐
c) Are less than the patient needs ☐
d) Don't Know ☐

Any Comments.....

9) Who do you think ought to be responsible for a patient's postoperatve pain relief? (Please tick any that apply)

a) Doctor ☐
b) Nurse ☐
c) Patient ☐
d) Other ☐ (Please specify).....
e) Don't Know ☐

Any Comments.....

10) In general, are you satisfied with the way postoperative analgesics are written up by the doctors? (Please tick one box)

a) Yes ☐
b) No ☐
c) It Varies ☐
d) Don't Know ☐

Any Comments.....

11) Would you be interested in any more information on pain relief? (Please tick one box)

a) Yes ☐
b) No ☐

If YES, please tick any you would like:-

i) Fact Sheet ☐
ii) Video/Film ☐
iii) Study Day ☐
iv) Other ☐ (Please specify).....

PERSONAL DETAILS

A) AGE (Please tick one box)

a) 18-25 ☐
b) 26-35 ☐
c) 36-45 ☐
d) Over 45 ☐

B) NURSING QUALIFICATIONS (Please tick any that apply)

a) SRN/RGN ☐
b) SEN ☐
c) Other, including post basic courses ☐ (Please specify).....

.....

C) How long have you been on this ward? (Please tick one box)

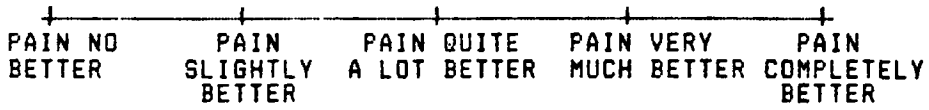
a) 0-6 months ☐
b) 7-18 months ☐
c) 19 months-5 years ☐
d) Over 5 years ☐

Thank-you very much for your time and help.

B.3 PAIN SCALE AS ADMINISTERED TO PATIENTS

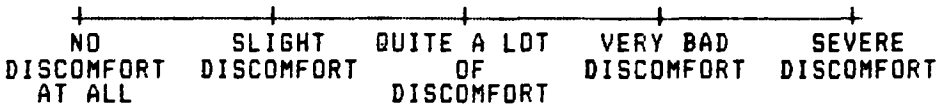
This was the actual scale which patients completed. They were asked to put a cross on this line, wherever was most like their pain now. The distance to the cross was then measured from the left hand side to the nearest 5mm (see appendix D.2.2) and this represented their pain score.

B.4 PAIN RELIEF SCALE AS ADMINISTERED TO PATIENTS



This was the actual scale which patients completed. They were asked to put a cross on this line wherever was most like their pain relief now. The distance to the cross was then measured from the left hand side to the nearest 5mm (see appendix D.2.2) and this represented their pain relief score.

B.5 DISCOMFORT SCALE AS ADMINISTERED TO PATIENTS



This was the actual scale which patients completed. They were asked to put a cross on this line wherever was most like their discomfort now. The distance to the cross was then measured from the left hand side to the nearest 5mm (see appendix D.2.2) and this represented their discomfort score.

B.6 STATE TRAIT ANXIETY INVENTORY

B.6.1 FORMS X-1 AND X-2

SELF-EVALUATION QUESTIONNAIRE

Developed by C. D. Spielberger, R. L. Gorsuch and R. Lushene

STAI FORM X-1

NAME _____ DATE _____

DIRECTIONS: A number of statements which people have used to describe themselves are given below. Read each statement and then blacken in the appropriate circle to the right of the statement to indicate how you *feel* right now, that is, *at this moment*. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe your present feelings best.

	NOT AT ALL	SOMEWHAT	MODERATELY SO	VERY MUCH SO
1. I feel calm	①	②	③	④
2. I feel secure	①	②	③	④
3. I am tense	①	②	③	④
4. I am regretful	①	②	③	④
5. I feel at ease	①	②	③	④
6. I feel upset	①	②	③	④
7. I am presently worrying over possible misfortunes	①	②	③	④
8. I feel rested	①	②	③	④
9. I feel anxious	①	②	③	④
10. I feel comfortable	①	②	③	④
11. I feel self-confident	①	②	③	④
12. I feel nervous	①	②	③	④
13. I am jittery	①	②	③	④
14. I feel "high strung"	①	②	③	④
15. I am relaxed	①	②	③	④
16. I feel content	①	②	③	④
17. I am worried	①	②	③	④
18. I feel over-excited and "rattled"	①	②	③	④
19. I feel joyful	①	②	③	④
20. I feel pleasant	①	②	③	④

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577 College Avenue, Palo Alto, California 94306

SELF-EVALUATION QUESTIONNAIRE

STAI FORM X-2

NAME _____ DATE _____

DIRECTIONS: A number of statements which people have used to describe themselves are given below. Read each statement and then blacken in the appropriate circle to the right of the statement to indicate how you *generally* feel. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe how you generally feel.

	ALMOST NEVER	SOMETIMES	OFTEN	ALMOST ALWAYS
21. I feel pleasant	①	②	③	④
22. I tire quickly	①	②	③	④
23. I feel like crying	①	②	③	④
24. I wish I could be as happy as others seem to be	①	②	③	④
25. I am losing out on things because I can't make up my mind soon enough	①	②	③	④
26. I feel rested	①	②	③	④
27. I am "calm, cool, and collected"	①	②	③	④
28. I feel that difficulties are piling up so that I cannot overcome them	①	②	③	④
29. I worry too much over something that really doesn't matter	①	②	③	④
30. I am happy	①	②	③	④
31. I am inclined to take things hard	①	②	③	④
32. I lack self-confidence	①	②	③	④
33. I feel secure	①	②	③	④
34. I try to avoid facing a crisis or difficulty	①	②	③	④
35. I feel blue	①	②	③	④
36. I am content	①	②	③	④
37. Some unimportant thought runs through my mind and bothers me	①	②	③	④
38. I take disappointments so keenly that I can't put them out of my mind	①	②	③	④
39. I am a steady person	①	②	③	④
40. I get in a state of tension or turmoil as I think over my recent concerns and interests	①	②	③	④

SELF-EVALUATION QUESTIONNAIRE

Developed by Charles D. Spielberger
in collaboration with
R. L. Gorsuch, R. Lushene, P. R. Vagg, and G. A. Jacobs

STAI Form Y-1

Name _____ Date _____ S ____

Age _____ Sex: M ____ F ____ T ____

DIRECTIONS: A number of statements which people have used to describe themselves are given below. Read each statement and then blacken in the appropriate circle to the right of the statement to indicate how you feel *right* now, that is, *at this moment*. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe your present feelings best.

	NOT AT ALL	SOMEWHAT	MODERATELY SO	VERY MUCH SO
1. I feel calm	①	②	③	④
2. I feel secure	①	②	③	④
3. I am tense	①	②	③	④
4. I feel strained	①	②	③	④
5. I feel at ease	①	②	③	④
6. I feel upset	①	②	③	④
7. I am presently worrying over possible misfortunes	①	②	③	④
8. I feel satisfied	①	②	③	④
9. I feel frightened	①	②	③	④
10. I feel comfortable	①	②	③	④
11. I feel self-confident	①	②	③	④
12. I feel nervous	①	②	③	④
13. I am jittery	①	②	③	④
14. I feel indecisive	①	②	③	④
15. I am relaxed	①	②	③	④
16. I feel content	①	②	③	④
17. I am worried	①	②	③	④
18. I feel confused	①	②	③	④
19. I feel steady	①	②	③	④
20. I feel pleasant	①	②	③	④

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577 College Avenue, Palo Alto, California 94306

SELF-EVALUATION QUESTIONNAIRE

STAI Form Y-2

Name _____ Date _____

DIRECTIONS: A number of statements which people have used to describe themselves are given below. Read each statement and then blacken in the appropriate circle to the right of the statement to indicate how you *generally* feel. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe how you generally feel.

	ALMOST NEVER	SOMETIMES	OFTEN	ALMOST ALWAYS
21. I feel pleasant	①	②	③	④
22. I feel nervous and restless	①	②	③	④
23. I feel satisfied with myself	①	②	③	④
24. I wish I could be as happy as others seem to be	①	②	③	④
25. I feel like a failure	①	②	③	④
26. I feel rested	①	②	③	④
27. I am "calm, cool, and collected"	①	②	③	④
28. I feel that difficulties are piling up so that I cannot overcome them	①	②	③	④
29. I worry too much over something that really doesn't matter	①	②	③	④
30. I am happy	①	②	③	④
31. I have disturbing thoughts	①	②	③	④
32. I lack self-confidence	①	②	③	④
33. I feel secure	①	②	③	④
34. I make decisions easily	①	②	③	④
35. I feel inadequate	①	②	③	④
36. I am content	①	②	③	④
37. Some unimportant thought runs through my mind and bothers me	①	②	③	④
38. I take disappointments so keenly that I can't put them out of my mind	①	②	③	④
39. I am a steady person	①	②	③	④
40. I get in a state of tension or turmoil as I think over my recent concerns and interests	①	②	③	④

APPENDIX C - LETTERS

C.1 PATIENT LETTER

Chelsea College

University of London

Department of Nursing Studies

552, King's Road
London SW10 0UA
01-351 2488

I am a nurse interested in looking at how patients respond to pain after an operation. I would like to ask you a few questions before your operation, and then visit you twice a day after your operation for one week. By asking these questions we hope to understand more about patients in pain, and be more able to help them. If you decide not to take part, it will in no way affect your treatment. If you decide you will take part and later change your mind, you can withdraw at any time.

All information will be treated in the strictest confidence and you will never be personally identified.

Thank-you for your time,

Yours sincerely,

Seers

Mrs.C.J.Seers, BSc(Hons) SRN

Nurse Researcher.

C.2 CONSENT FORM

D.H.S.S. NURSING RESEARCH STUDENTSHIP PROJECT - CONSENT FORM

I, ... agree to take part in this study, which has been explained to me by C.J.Seers, and I understand I may withdraw from the study at any time.

Signature ..... Date.....

C.3 NURSES LETTER

Chelsea College

University of London

Department of Nursing Studies
552, King's Road
London SW10 0UA
01-351 2488

I am a nurse interested in looking at how patients respond to pain after an operation. If patients consent to take part in the study, they will be interviewed pre-operatively, and their condition evaluated twice a day postoperatively for one week.

I would like to ask your help in assessing patients' pain and pain relief levels on a pain/pain relief scale that I will explain and give you just before I visit the patient postoperatively.

Thank-you for your time,

Yours sincerely,

CSeers

Mrs.C.J.Seers, BSc(Hons) SRN

Nurse Researcher.

C.4 GENERAL INFORMATION SHEET FOR WARD PRIOR TO START OF STUDY

Chelsea College

University of London

Department of Nursing Studies

552, King's Road
London SW10 0UA
01-351 2488

February 1984

PROPOSED NURSING RESEARCH STUDY BY C.J.SEERS

General Information sheet

This study would involve interviewing abdominal surgical patients, pre and postoperatively, to find out their response to pain following surgery. The preoperative interview would last about twenty minutes, postoperatively interviews would last upto fifteen minutes, and be conducted twice a day for one week. Written consent to participate in the study would be obtained from the patient, who would be given a letter explaining the research. The Nurse-in-charge of the patient would be interviewed for about a minute before approaching the patient, to ask him/her how that patient was responding to postoperative pain. All nurses would receive a letter explaining the purpose of the research.

Before starting the pilot study, I would like to spend one or two days evaluating three different scales to measure pain, asking about ten postoperative patients which they prefer and find easiest to use. Then, one-two weeks later, I would like to carry out a pilot study involving ten patients to find out if there are any problems with the design of the study. This will take upto four weeks. The data obtained will then be studied for two-three months, and after this I would like to start the main study, involving about 100 patients.

* * * * * * * * * * * * * * * * * * * *

APPENDIX D – ADMINISTRATIVE/CODING DETAILS

D.1 TIME SCHEDULE FOR PATIENT INTERVIEWS

	TIME						
	09:30	10:00	10:30	11:00	11:30	12:00	12:15
	14:00	14:30	15:00	15:30	16:00	16:30	17:00
85 71 57 43 29 15 01	1	2	3	4	5	6	7
86 72 58 44 30 16 02	7	1	2	3	4	5	6
87 73 59 45 31 17 03	6	7	1	2	3	4	5
88 74 60 46 32 18 04	5	6	7	1	2	3	4
89 75 61 47 33 19 05	4	5	6	7	1	2	3
90 76 62 48 34 20 06	3	4	5	6	7	1	2
91 77 63 49 35 21 07	2	3	4	5	6	7	1
92 78 64 50 36 22 08	1	2	3	4	5	6	7
93 79 65 51 37 23 09	7	1	2	3	4	5	6
94 80 66 52 38 24 10	6	7	1	2	3	4	5
95 81 67 53 39 25 11	5	6	7	1	2	3	4
96 82 68 54 40 26 12	4	5	6	7	1	2	3
97 83 69 55 41 27 13	3	4	5	6	7	1	2
98 84 70 56 42 28 14	2	3	4	5	6	7	1

PATIENT NUMBER — POSTOPERATIVE DAY

D.2 CODING FRAMEWORK

D.2.1 CODING FRAMEWORK FOR OPEN ENDED QUESTIONS

Codes for missing data and 'don't know' were included for all questions. A code for 'patient discharged' was included for all postoperative questions.

Preoperative Questions

PRQ06 - Do you expect the nurse will know when you need a painkiller or will you have to ask?

Codes:- 1. Nurse will know/ask, 2. I will ask, 3. Other/or more than one answer, 4. It varies.

PRQ07 - What do you normally do if you have pain?

Codes:- 1. Tablets/Drugs, 2. Rest, 3. Put up with it, 4. Don't have pain normally, 5. Tablets and rest, 7. Other or mixture of techniques.

PRQ08 - What are your feelings about taking painkillers?

Codes:- 1. Don't like them, 2. Don't mind them, 3. Only take them if pain is bad.

PRQ10 - How do you feel about coming into hospital for an operation?

Codes:- 1. Don't mind, 2. Nervous/Apprehensive, 3. Don't Mind, although nervous, 4. Glad, 5. I have no alternative, 6. Other, 7. Hate it.

PRQ11 - Is there anything in particular that worries you?

Codes:- 1. Anaesthetic, 2. Scar, 3. Effect it will have on relatives, 4. Actual operation, 5. Whole thing, 6. No worries, 7. Pain, 8. The unknown, 9.

Human error, 77. Multiple.

PRQ12 - How do you feel in yourself?

Codes:- 1. Negative, 2. Not negative, 3. Mixed.

The negative category would include responses such as terrible or awful. The not negative category would include more neutral responses such as 'O.K.' or not bad, as well as more positive responses such as very good or excellent. The mixed category would include responses such as up and down, or bad this morning, but much better now.

PRQ13 - If you feel bad or things get bad is there anything you do or think to feel better?

Codes:- 1. Affective, 2. Problem Solving, 3. Both, 4. Neither.

(See Appendix D.3 for responses in each category)

Postoperative Questions

Q01B - How does this make you feel? (The pain)

Codes:- 1. Tired/weak/ill, 2. Miserable/depressed/unhappy, 3. OK/doesn't bother me, 4. Can't move because of it, 5. Sick.

Q05A - Comments About Discomfort.

Codes:- 1. Sore bottom/back/heels, 2. Hot/Cold, 3. Tubes (includes intravenous lines, catheters, any other tubes), 4. Passing urine, 5. Dragging/Tugging sensations, 6. Wind, 7. Dizzy/faint, 8. Nausea, 9. General, 10. Tensed, 11. Headache, 12. From lying still/in bed, 13. Wound, 14. Dry mouth, 15. Tired/weak, 16. Sore throat, 17. Can't move, 18. Breathing, 19. Bowels, 20. Pain, 77. Other, including combinations of responses.

Q23 - Do you feel fed-up at all?

Codes:- 1. Fed-up, 2. Not fed-up, 3. Mixed.

Q24 - Do you feel bored at all?

Codes:- 1. Bored, 2. Not bored, 3. Mixed.

Final Interview Comments

Q27 - How do you feel your pain was controlled overall?

Codes:- 1. Better than expected/very well, 2. Average/reasonable/as expected, 3.Worse than expected/not very good, 4. It was variable, 5. Other.

Q28a - Did you know what to if you had pain? (Comments)

Codes:- 1. Ring for nurse, 2. Take a painkiller, 3. Do something about it myself, 4. Put up with it, 77. Other.

Q29a - Did you feel you could have a painkiller when you wanted it or not? (Comments)

Codes:- 1. Nurse said I could, 2. The nurse asked me, 3. Only at a fixed time/a fixed number, 4. You can't always get one.

Q30a - Was your pain as you expected? (Comments)

Codes:- 1. Better than expected/not as bad, 2. As expected, 3. Worse than expected, 4. Not the same/different than expected.

Q31a - Was there anything in particular which made you more comfortable? (Comments)

Codes:- 1. Nice nurses, 2. Painkillers, 3. Other patients, 4. Researcher, 5. Multiple reasons, 6. Everyone so nice/atmosphere, 7. Getting better, 8. Other.

Q32 - Is there anything in particular you would like to have known before your operation?

Codes:- 1. No, 2. Did not know anything, 3. Wanted more details, 4. Glad I did not know/did not want to know, 77. Other.

D.2.2 CODING OF PAIN, PAIN RELIEF AND DISCOMFORT SCALES

These were measured to the nearest 5mm as shown below. This was then coded to avoid using three digit numbers when setting up the computer data file which would have created logistical problems.

mm MEASUREMENT	TO NEAREST 5mm	CODE
00-02	0	0
03-07	5	1
08-12	10	2
13-17	15	3
18-22	20	4
23-27	25	5
28-32	30	6
33-37	35	7
38-42	40	8
43-47	45	9
48-52	50	10
53-57	55	11
58-62	60	12
63-67	65	13
68-72	70	14
73-77	75	15
78-82	80	16
83-87	85	17
88-92	90	18
93-97	95	19
98-100	100	20

D.3 JALOWIEC COPING SCALE - DICHOTOMOUS CLASSIFICATION OF COPING BEHAVIOURS

AFFECTIVE	PROBLEM SOLVING
Worry	Consider different solutions
Cry	Let others solve the problem
Activity/exercise	Try anything
Optimism	Discuss problem
Humour	Acceptance
Eat/Smoke	View problem objectively
Drink	Maintain control
Drugs	Seek purpose/meaning
Put the problem aside	Try to change the situation
Daydream	Information seeking
Pessimsim	Try different solutions
Get mad/curse	Use past experience
Pray/trust God	Handle problem piecemeal
Get nervous	Set goals
Situational withdrawal	Settle for the next best thing
Blame others	
Release tension on others	
Isolation	
Resignation/It's hopeless	
Let problem solve itself	
Get comfort/help from others	
Meditation/Mind over matter	
Resignation/It's fate	
Sleep	
Don't worry	

From: Jalowiec et al(1984) p158

'Music' and 'reading' were added to the affective category in the present study.

APPENDIX E – VARIABLES USED IN OTHER STUDIES TO ASSESS RECOVERY

VARIABLE	STUDY (see key) a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	N
ANALGESICS	X		X			X	X			X	X	X	X	X			X	X	X	X	X	X		15
PAIN			X	X	X		X	X				X	X	X	X		X	X	X		X	X	X	15
DAYS TO DISCHARGE	X					X				X	X	X	X			X		X	X	X	X			11
COMPLICATIONS			X			X		X		X							X	X	X			X		8
PSYCHO. S./COMPLIC			X			X				X								X	X	X	X	X		8
SEDATIVES						X												X	X	X	X	X		6
BP/P/TEMPERATURE		X	X										X											3
NAUSEA & VOMITING			X																			X	X	3
SLEEP														X								X	X	3
APPETITE														X									X	X	3
STRENGTH & ENERGY														X									X	X	3
STOMACH CONDITION														X									X	X	3
BOWEL CONDITION														X									X	X	3
URINATION														X									X	X	3
SELF ASSISTANCE														X									X	X	3
INT. IN SURROUNDS.														X									X	X	3
MOBILITY													X	X										X	3
MOOD													X	X				X							3
DAY OF MOBILISATION																		X				X			2
VITAL CAPACITY								X									X								2
NURSE ASSESMENT			X																			X			2
ANXIETY & STRESS														X						X					2
PATIENT COMPLAINTS							X																		1
LIFE EVENTS																						X			1
DISTRESSING EVENTS														X											1
FEELINGS/ATTITUDES														X											1
PATIENT OPINION FORM														X											1
ANTI-EMETICS																						X			1
HYPNOTICS																		X							1
DAYS TO DIET																		X							1
PHYSICAL STATE			X																						1
WASHING INDEPENDENTLY														X											1
NORMAL BODY FUNCTION																					X				1
ENDURANCE CAPACITY									X																1
MUSCLE STRENGTH									X																1
DOCTORS ASSESSMENT			X																						1
NURSING CARE																							X		1
MEDICAL CARE																							X		1
FAMILY ASSESSMENT																						X			1

KEY:
a)ANDREW(1970)
b)AUERBACH(1973)
c)BOORE(1978)
d)BRUEGEL(1971)
e)CHAPMAN & COX(1977)
f)COHEN & LAZARUS(1973)
g)CRONIN et al(1973)
h)DALRYMPLE et al(1972)
i)FORDHAM(1982)
j)FRAULIN(1983)
k)HAYWARD(1975)
l)JOHNSON et al(1971)
m)JOHNSON et al(1978)
n)JOHNSTON(1984)
o)MARTINEZ-URRUTIA(1975)
p)MURRAY et al(1986)
q)PARBROOK et al(1973)
r)RAY(1982b)
s)RAY & FITZGIBBON(1981)
t)SIME(1976)
u)THORIGKRAJAI(1986)
v)WOLFER & DAVIS(1970)
w)WOLFER et al(1978)

PSYCHO.S./COMPLIC.=PSYCHOLOGICAL STATE AND/OR COMPLICATIONS

APPENDIX F - ADDITIONAL INFORMATION

F.1 NEUROPHYSIOLOGY AND NEUROANATOMY OF PAIN

F.1.1 Peripheral Mechanisms

Pain is non-specific as it can be caused by mechanical, thermal or noxious chemical stimuli. It can be caused by superficial stimuli, (from skin), by deep stimuli, (from skeletal muscle, tendons and joints), or by visceral stimulation, Chung & Dickenson(1981). There are no known specific end organs for pain such as, for example, Meissners corpusles involved in light touch or Ruffini end organs providing information about continous heavy pressure/heavy touch. Pain receptors or nociceptors are free nerve endings. Information about pain is obtained from these free nerve endings. They detect physical and chemical damage to the tissues and form a widespread and overlapping network in almost all tissues of the body. Most noxious impulses arise in receptors which at lower levels of stimulation would produce non-noxious irritation, Lipton(1979).

These nerve endings exhibit marked specificity of response, outlined by Willis & Coggeshall(1978). The thermoreceptors respond to heat (+45 degrees centigrade) and cooling, and to intense mechanical stimulation. Mechanoreceptors respond to mechanical injury such as a squeeze or prick which damages the skin and distorts the receptor and/or adjacent cells. They show no response to noxious heat, cold or chemicals. Polymodal receptors are responsive to thermal, mechanical and chemical stimulation. Nociceptors may be activated by chemical substances released into the tissues in response to injury, or if not activated, the nociceptors may be sensitised by these chemicals, Willis & Coggeshall(1978).

Examples of these chemicals include bradykinin, histamine 5-hyroxytryptamine and prostaglandins, Willis(1985).

As can be seen from Melzack & Wall's(1965) gate theory of pain, the reception, transmission and perception of pain is complex and involves more than a single stimulus-response pathway. There is, however, often lack of evidence or conflicting evidence and arguments over the various pathways and mechansims involved.

F.1.2 Peripheral Nerve Pathways

Pathways from the nociceptors to the spinal cord are mediated by two types of fibres, each of which transmits and processes pain impulses in a different way. They are Aδ and C fibres. Aδ fibres are small myelinated fibres which conduct impulses at 6-30 metres per second, Melzack & Wall(1982). Thes fibres provide a fast conducting pathway for pricking and sharp pain. C fibres are smaller unmyelinated nerve fibres. They form a series of short interconnecting neurons, which conduct at a slower rate of 1-2.5 metres per second, Melzack & Wall(1982). This slower pathway conducts dull, diffuse more persistent pain. Stimulation at noxious intensities evokes activity in both systems. An example of Aδ and C fibre pain is that of a pinprick, where a sharp Aδ pain is felt immediately, followed by a dull, aching C fibre pain. C fibres outnumber Aδ fibres by at least 2:1, Willis(1985).

Nociceptors are served by both Aδ and C fibre afferent neurons. Aδ and C fibres have mechanical and thermal nociceptors, and the C fibre group also contains the polymodal group of receptors.

F.1.3 Spinal Cord Pathways

Both the Aδ and C fibre peripheral sensory afferents enter the spinal cord via the dorsal horn. The dorsal horn of the spinal cord is anatomically divided into 6 laminae, first described by Rexed(1952). These laminae do not have rigid, exact boundaries, Wall(1984). Rexed(1952) called these boundaries 'zones of transition.'

Laminae II and III are usually regarded as comprising the substantia

gelatinosa, an area of densely packed nerve fibres, Melzack & Dennis(1978), Budd(1984). Many afferent fibres terminate here, and it is thought to be the site of the gating mechanism proposed by Melzack & Wall(1965) in their gate theory of pain. Certain laminae appear to be involved in the transmission of noxious impulses. Laminae I, II and III receive both Aδ and C fibres. Laminae IV, V and VI receive Aδ fibres, Budd(1984). Each of the laminae can receive a direct input from primary afferent fibres, but also has an input from the previous laminae if neuronal activity is high. It will, in turn if its own activity is high, transmit to adjacent laminae, Budd(1984).

F.1.4 Spinal Ascending Pathways

The spinal ascending pathways are divided into two groups, a rapidly conducting or oligosynaptic system and a more slowly conducting multisynaptic system.

F.1.5 Oligosynaptic System

The Aδ neurons synapse in the nucleus proprius (consisting of laminae IV, V and VI) and the substantia gelatinosa (consisting of laminae II and III) of the dorsal horn, Budd(1984). They cross over in front of the central canal to reach the contralateral spinothalamic tract. The spinothalamic tract travels towards the posterolateral ventral nucleus of the thalamus, also known as the neothalamus. From here, information is relayed to the somatosensory cortex. However, not all its fibres take this route. Many neurons turn into the brainstem reticular formation from the spinoreticular fibres, which branch off the main spinothalamic tract. Although intermingled in the anterolateral quadrant of the spinal cord, the spinothalamic and spinoreticular systems are separate. Willis(1985) desribes this anterolateral quadrant of the spinal cord as the most important pathway for pain in man. Melzack & Casey(1968) propose the sensory/discriminative aspect of pain is transmitted primarily via this system.

The dorsal column pathways also form an oligosynaptic pathway which has been linked to pain. However, this pathway seems to be connected with touch and pressure more than pain and leads to cuneate and gracile nucleus. Willis(1984) says "nothing is known about possible second order dorsal column pathways in the human." Although Dennis & Melzack(1977) report that traditionally the dorsal columns have been associated with innocuous proprioceptive/tactile information. They state that whilst this seems correct for primary dorsal colum fibres it is not so for their secondary afferents, which appear to have some role in the transmission of nociceptive information. So the role the dorsal column pathways play in pain, if any, is uncertain.

F.1.6 Multisynaptic System

C fibres follow a different and a less direct pathway to the brain. There are two pathways, a spinal reticular core (the fasciculi proprii) and Lissauer's tract. The spinal reticular core comprises long chains of neurons that extend to the brain stem reticular formation. Lissauers tract carries axons of the substantia gelatinosa on each side of the cord. A relay of interconnecting neurons carry information to the medial and intralaminar thalamic nuclei, known as the palaeothalamus. If the stimulus activates enough cells in the brainstem reticular formation, information will radiate to the limbic system (involving emotion and memory), and basal ganglia (involving movement control), as well as to the cortex (involving location and judgement of the stimulus). The reticular formation acts to organise and integrate information from diverse sources and influences sensory, motor and autonomic activity. Willis(1985) argues the reticular formation is likely to participate in the motivational/affective component of the pain response.

The fast conducting system can be viewed as a sheath around the reticular core that comprises the multisynaptic system. The fast conducting system is a more recent, discriminatory system added around the central core which begins as the fasiculi proprii and widens to include the brain stem

reticular activating system, from which information radiates to the cortex.

The cortex is not necessary for the perception of pain, Ganong(1981), but is processes pain sensations: it is concerned with the discriminative, exact and meaningful interpretation of pain. It locates and judges the pain, comparing it to past experience, and deciding whether it will take on its normal emotional qualities.

There are thus multiple pain pathways and there is no one 'centre' in the brain for pain. Many areas are involved and they interact extensively. Guilband, Reschanski & Besson(1984) state nociception and pain are not related exclusively to a unique system of pathways, relay nuclei or centres.

F.1.7 The Autonomic Nervous System

The autonomic nervous system(ANS) controls the activities of viscera, glands, blood vessels and smooth muscle. It is divided into the sympathetic and parasympathetic nervous systems, and is primarily regulated by the hypothalamus. Afferent fibres from visceral and non visceral structures travel to the spinal cord and either return to the periphery via an autonomic reflex arc, or ascend to higher centres in the reticular formation of the brain stem and hypothalamus from which the control of autonomic function is mediated. The pathway to the brain is similar to that taken by the multiple ascending system, Bond(1984). Neurons from the hypothalamus project to the anterior and medial nuclei of the thalamus, and from there to the cortex and limbic system.

Visceral events normally only reach consciousness if the internal environment has substantially altered. The viscera are mainly sensitive to tension and chemical changes, and are relatively insensitive to burning, cutting and crushing. Visceral pain is usually poorly localised due to sparse innervation. It may be referred and is characterised by vague, dull aches, often associated with nausea and vomiting and general malaise. If visceral pain does become localised, no longer are only autonomic afferents involved,

but the body wall too, with its somatic afferents. For example, the late localisation to the right iliac fossa of pain in appendicitis.

Visceral pain is usually either chemical (inflammation or spilt gastric contents) or due to distension, spasm or ischaemia, Chapman(1985).

F.1.8 Referred Pain

Referred pain can come from visceral or deep somatic structures. Pain can be referred to other somatic structures but does not originate from superficial structures. Pain is usually referred to a structure developed from the same embryonic segment, or dermatome. For example, the heart and arm are in the same segment and the pain of a heart attack is often referred to the inner aspect of the left arm. Another type of referred pain is associated with trigger points. The trigger point is a small, hypersenstive region in the muscle or connective tissue which can be located in the area of pain or at some distance from it. The referred pain does not follow known dermatomes, but stimulation will produce pain in a relatively constant and predictable location, Meinhart & McCaffery(1983).

Nerves from the visceral strucure and the somatic structure to which the pain is referred enter the nervous system at the same level. There are more sensory fibres in peripheral nerves than there are axons in the spinothalamic tract, thus convergence of peripheral sensory fibres on the spinothalamic neurons occur.

There are two theories about referred pain, and Bond(1984) argues that both are probably correct.

Convergence Theory

This theory contends that somatic and visceral afferents converge on the same spinothalamic neurons, and since somatic pain is more common than visceral pain, the brain takes the activity in a certain pathway as being caused by a pain stimulus in a certain somatic region. This is supported by

the work of Milne, Foreman, Giesler & Willis(1983).

Facilitation Theory

This theory contends that incoming visceral impulses lower the threshold of the spinothalamic neurons receiving afferents from somatic areas, so minor activity in pain pathways that would normally die out in the spinal cord passes onto the brain.

F.1.9 Responses to Pain

Motor Responses

The motor cortex is responsible for precise integration and control of voluntary muscle contraction. Nociceptive information descends via pyrimidal and extrapyrimidal tracts. It travels to the spinal cord and terminates on the ventral horn of motor neurons. Impulses are thus transmitted to skeletal muscles.

Autonomic Responses

Responses to pain from thoracic and abdominal viscera are almost exclusively mediated via the sympathetic system. Responses to pain from the oesphagus, trachea and pharynx are mediated via vagal efferents, and pain from deep in the pelvis is mediated via the sacral parasympathetic system.

F.2 Neurophysiological Modulation of Pain

These influences have been reviewed in detail by Fields & Basbaum(1978), and considerable work is being carried out at present in this area. A brief overview will be presented here. Most of this work has been undertaken in animals and the extent to which it applies to humans is unclear.

The transmission of nociceptive information is not determined not only by the intensity of nociceptive afferent discharge, but can be modulated by descending influences from the brain, which according to Watkins & Mayer(1982), are multiple.

Fields & Basbaum(1978) propose the periaqueductal grey (PAG), is at the origin of a descending pain modulating circuit. They argue that the PAG and rostral ventromedial medulla(RVM) are important in desending pain control mechanisms. There are few direct PAG to spinal projections, and the influence of the PAG is probably mediated through the RVM. The PAG forms a major excitatory input to the RVM, which gives rise to the bulk of pain modulating fibres. There is a pathway which extends from the frontal cortex and hypothalamus through the PAG to the RVM and then to the superficial layers of the dorsal horn. Activation of this system can produce supression of nociceptive dorsal horn neurons, resulting in analgesia. Hosobuchu, Adams & Linchitz(1977) demonstrated this by stimulating the PAG and producing pain relief in six patients with previously intractable pain. This relief was reversed by naloxone in five of the six patients, suggesting modulation was mediated via opiate mechanisms. However no report is made of any attempted 'double-blind' reversal with, for example, normal saline. Together with the small numbers of patients in this study, replication would be necessary to confirm these results.

Many parts of this modulating system are situated in regions rich in peptides or amines. There is evidence to implicate both these groups of substances in pain modulation. There are many putative transmitters or modulators, but this review will be limited to a brief discussion of the role

of 5-hydroxytryptamine(5-HT), substance P and the endorphins because most is known about them.

F.2.1 5-Hydroxytryptamine and Substance P

5-HT is involved in diffuse noxious inhibitory control, LeBars, Calvino, Villanueva & Cadden(1984). It is largely, if not totally, derived from the brain stem, Fields & Basbaum(1984). Substance P is thought to be released from the primary afferent neurons on receipt of a pain stimulus and has an excitatory influence in transmitting this impulse to ascending neurons and hence the brain. Cuello & Matthews(1984) found the anatomy of substance P containing peripheral fibres corresponded with the distribution of nociceptors.

The superficial layers of the dorsal horn, important in transmission of nociceptive impulses, Melzack & Wall(1965), were found by LaMotte & deLanerolle(1983) to be rich in 5-HT and substance P. Kantner,Kirby & Goldstein(1985) also found substance P increased in the dorsal horn of rats following chemically induced nociception.

Both these substances have been linked with opiates. 5-HT systems appear to contribute to the antinociceptive action of opioids: The analgesic action of systemmic opioids is blocked by depletion of 5-HT, Basbaum, Moss & Glazer(1983). Clement-Jones & Besser(1984) postulate opioid receptors may modulate the release of substance P. This would confirm the work of Brodin, Gazelius, Panopoulos & Olgart(1983) who found morphine inhibited stimulus evoked response of substance P from peripheral nerve endings of primary afferents in cats. The role of endogenous opiates will now be reviewed in more detail.

F.2.2 Endogenous Opiates

Endorphins are endogenous opiates which are morphine-like in their activity and produce their actions by interacting at specific binding sites.

Endorphin research has been intensive in the past decade, since Hughes, Smith, Kosterlitz, Fothergill, Morgan & Morris(1975) and Hughes(1975) isolated these endogenous opioid peptides. The physiological roles of these opioids has yet to be fully established, but analgesia, reproductive endocrinology, respiratory control, thermoregulation and euphoria/dysphoria, amongst others, may be involved, Cannon, Liebeskind & Frenk(1978). It is misleading to think of opiates as exclusively antinociceptive, but it is this context that they will be considered here. The characteristic effect of opiates in man is less a blunting of the pain sensation, than a state of indifference or emotional detatchment from the experience of suffering, Goldstein(1976). This implies an influence on affective states. If morphine acts on the reactive component of acute pain, endogenous opiates probably modulate pain in clinical states where pain is associated with fear and anxiety.

At present, two groups of peptides have been isolated, the endorphin group and an enkephalin related group. The first group includes α, β, γ and δ endorphin, of which, β endorphin is the most potent analgesic. The enkephalin related group includes methionine or met-enkephalin, and leucine or leu-enkephalin, and dynorphin, amongst others. Only β endorphin and met-enkephalin have been extensively studied in man. These peptides have a common amino acid sequence, which makes measuring them individually very complex.

The distribution of the two types of opioid peptides differs considerably. Endorphin is mainly produced by cells in the anterior or non-neural pituitary and hypothalamus, Copolov & Helme(1983), and may be a neurohormone. Both brain and anterior pituitary make a large precursor molecule, pro-opiomelanocortin. In the pituitary this is processed to form, amongst other things, adrenocorticotrophic hormone (ACTH) and endorphin. The brain pro-opiomelanocortin control mechanisms are completely separate from those of the pituitary. Endorphin is found in the limbic stuctures, the hypothalamus, PAG and dorsal horn, Terenius(1984). Enkephalins

are pentapeptides (rather than the endorphin polypeptides). Although they consist of part of the endorphin sequence, they are not cleaved from it, but have a separate precursor, proenkephalin, and control of secretion is completely separate from that related to endorphin.

Enkephalins are widely distributed and found in the highest concentration in the globus pallidus (and thus may have a role in locomotion, Hong, Yang, Fratta & Costa, 1977). In the spinal cord, enkephalin terminals from a dense network in laminae I, II and V of the dorsal horn. Enkephalin fibres are present in many areas of the brain, including the PAG, medial thalamus, hypothalamus, substantia nigra and cuadate nucleus, Terenius(1984). It is found in low concentrations in the pituitary, plasma, cerebral spinal fluid, adrenal medulla, sympathetic ganglion and vagal neurons. Enkephalins are very suseptible to proteolytic attack, and its wide distribution and rapid transmission suggest a possible role as a neurotransmitter or modulator of synaptic function, Pasternak & Childers(1983). Duggan(1983) concluded enkephalin appears to act as an inhibitory transmitter.

The variation in distribution of enkephalin and endorphin and the different biosynthetic origins suggest the two peptides represent different systems.

Exogenous and endogenous opiates bind to opiate receptors, inhibiting transmission ot the noxious impulse. Opiate receptors are of more than one type, with the μ receptor seeming the most likely to be involved in analgesic action of powerful drugs, Terenius(1982). He further suggets that endorphins may act as a "pain stat" in the central nervous system, setting pain modulating capacity at certain levels. The brain has the highest concentration of opiate receptors, and receptors are found in the PAG. In the forebrain the hypothalamus and limbic system (especially the amygdala complex which may control inner feelings and emotions), then the dorsal horn of the spinal cord have the highest concentrations of opiate receptors with the

fewest found in the gastrointestinal tract.

F.2.3 The Role Of Endorphins In Analgesia

Pert(1982) outlines three ways in which endorphins may induce analgesia. First by suppressing spontaneous and pain induced activation of dorsal horn cells, second by interfering with the processing of pain in terminal areas of the pain pathway (such as in the medial thalamus, PAG, and reticular formation), preventing access of pain information to the limbic structures that mediate the affective and emotional components of the pain experience. Third, by descending inhibitory mechanisms that regulate nociceptive reflexes. Pert goes on to suggest that the brain contains an endogenous pain supression mechansim that functions either by a) being part of a tonically active inhibitory system or b) a system phasically activated by certain enviromental conditions or endogenous factors. If the system is tonically active, opiate antagonsim should lead to hyperalgesia, but the effects are subtle and depend on a multitude of factors, suggesting a phasically active pain supression system is likely.

There is still more work to be done in this area, in which Copolov & Helme(1983) describe speculation as "unusually easy and tempting." The endogenous opioid system is very complex and most interpretations are tentative.

APPENDIX G - FORTRAN PROGRAM INITIALLY USED IN THE ANALYSIS

```
 1          INTEGER IDAT(80)
 2          DATA IRR,IRQF,IRPN,IQS,IQN,IQM,IQF/7*0/
 3          DO 70 K=1,14
 4          DO 50 I=1,1040
 5          READ(99,10)(IDAT(J),J=1,80)
 6 10       FORMAT(80I1)
 7          IRPN=100*IDAT(1)+10*IDAT(2)+IDAT(3)
 8          IF(13*((I+12)/13) .EQ. (I+2))IRQF=IDAT(12)
 9          IF(IRQF .NE. 3) GO TO 50
10          IF(13*((I+9)/13) .NE. (I+9))GO TO 50
11          IRR=10*IDAT(46+2*K)+IDAT(47+2*K)
12          IF(IRR .GE. 66)GO TO 50
13          IQS=IQS+10*IRR
14          IQN=IQN+1
15 50       CONTINUE
16          REWIND 99
17          WRITE(101,30)K
18 30       FORMAT(3X,I2)
19          IQM=IQS/IQN
20          DO 60 I-1,1040
21          READ(99,10)(IDAT(J),J=1,80)
22          IRPN=100*IDAT(1)+10*IDAT(2)+IDAT(3)
23          IF(13*((I+12)/13) .EQ. (I+12))IRQF=IDAT(12)
24          IF(IRQF .NE. 3)GO TO 60
25          IF(13*((I+9/13) .NE. (I+9))GO TO 60
26          IRR=10*IDAT(46+2*K)+IDAT(47+2*K)
27          IF(IRR .GE. 66)GO TO 60
28          IQF=10*IRR+100-IQM
29          WRITE(100,20)I,IRPN,IRQF,K,IQF
30          WRITE(101,20)I,IRPN,IRQF,K,IQF
31          WRITE(102,40)K,IQM
32 40       FORMAT(3X,I2,3X,I4)
33 20       FORMAT(3X,I4,3X,I4,3X,I2,3X,I3,3X,I5)
34 60       CONTINUE
35          REWIND 99
36          IQS=0
37          IQN=0
38 70       CONTINUE
39          STOP
40          END
```

Courtesy K.Jacka

This program was developed in attempt to compensate for the dispersion of raw scores and the effects of time on these scores. It was initially used to study the effect of diagnosis on pain, however, it was still unable to detect any significant differences, so its use was abandoned.